Master Thesis in Innovation and Technological Entrepreneurship

2015/2016

Business Planning, Entrepreneurship Education and New Venture Success: Are we Doing it Right?

Isabel Margarida Gaspar Pereira

Supervisor: Aurora A.C. Teixeira

June 2016

Bio

Isabel Margarida Gaspar Pereira, born in March 1985, in Coimbra, Portugal, completed her MSc in Mechanical Engineering in the University of Coimbra in 2008. By then, she had been the president of Student's Body in High-School and at University and had taken a course in Technology Based Entrepreneurship, by the University of Coimbra [UC]. She had also started a junior company within the UC, integrated in her research for her MSc's dissertation, on Entrepreneurship and Risk.

After graduating she started to work for a Portuguese corporate group, first as a factory manager, setting up a new factory, and afterwards as a commercial manager, managing the expansion of the company in the United Kingdom. After three years on the job she was invited to go to Brazil to start a new spin-off of the group, in the São Paulo region. This was a turn-point moment in her career as, after successfully setting up the company and factory, she decided to focus on Entrepreneurship and make it her live.

She returned to Portugal, where she started to attend MIET. She started to work as a freelance consultant and entrepreneur, providing services to organizations such as University of Porto and others and setting up companies for a living. In this period she has launched one industrial company for a French group, has supported 4 organizations in developing sales and internationalization plans and has set up 2 businesses with other partners.

Acknowledgements

I would like to deeply thank Professor Aurora for all the support and for kindly receiving me even afterhours.

I would like to thank my husband Carlos for putting up with me throughout the whole process.

I would like to thank all the colleagues and teachers that took some time off their schedules to answer my survey and interviews.

Abstract

The role of business plans and business planning (BP) and their importance for entrepreneurs has been fairly discussed in the literature but its usefulness is still subject to a wide debate and controversy. Lecturing BP in formal entrepreneurship education is quite a spread practice but it is usually a choice made based on anecdotal experience rather than on scientific assessments.

The main objective of this work was to assess whether the current way of teaching BP in Entrepreneurship Education is actually useful for the alumni in terms of former's students professional lives.

Focusing on MIETE (Master in Innovation and Technological Entrepreneurship), a master created in 2004 by the schools of Engineering and Economics of University of Porto (Portugal), the present dissertation combined qualitative and quantitative methodologies. This encompassed 7 personal interviews, including the director of the master, 5 lecturers and 2 students, as well as an online survey targeting all MIETE's students from the first until the 11th edition.

Based on 84 responses and resorting to econometric estimations, we demonstrate that even though some of the tools used to build a business plan (BP) are seen as very useful – SWOT Analysis, Marketing Mix and Business Model Canvas-, the overall dimensions of the BP are not perceived as being of great importance. However, some significant differences between the perceived perception regarding BP tools and dimensions exist among the Alumni. Specifically, entrepreneurs, compared to non-entrepreneurs tend to attribute greater importance to the financial tools and dimensions such as Cash flow Statements and Balance Sheet, as well as to Company and Product/Service Description, Marketing and Sales Plan and Risk Analysis.

Keywords; entrepreneurship; entrepreneurship education; business plan; entrepreneurs;

JEL-Codes: L26 Entrepreneurship; A23 Graduate Economic Education and Teaching of Economics; I23 Higher Education

Index of Contents

Index of Tables

Tables in Appendix

Index of Figures

1. Introduction

A large number of research works start their abstracts and introduction paragraphs by referring the boom of entrepreneurship education programs in the past 3 decades (see, for instance, Hynes, 1996; Russel et al., 2008; Mwasalwiba, 2010; Fayolle, 2013; Pardo 2013; Pardede, 2015; Piperopoulos and Dimov, 2015; Sirelkhatim and Gangi, 2015) or by referring the importance of entrepreneurship for economic development and/or job creation (see, for instance, van der Kuip and Verheul, 2003; Vijverberg, 2008; Ghina, 2013; Rideout and Gray, 2013).

Even though entrepreneurship education presents a booming trend, the syllabus and its usefulness are fairly understudied (Honig, 2004; Fayolle 2013; Rideout and Gray, 2013). Business Planning or Business Plan (BP) is one of the paths often chosen by lecturers to incite students to create their startup ventures. BP is defined as "a written document that describes the current state and the presupposed future of an organization" (Honig and Karlsson, 2002: 29).

Even though the teaching of BP in entrepreneurship education is quite spread (Mwasalwiba, 2010; Sirelkhatim and Gangi, 2015), the decision regarding its content is not usually based on academic research but more on experience (Honig, 2004). The BP in itself has been subject to great discussion on whether it is in fact important or not.

Much of the research prior to 2001 establishes that BP is not a very useful tool for entrepreneurs as it is built under a great level of uncertainty (Delmar and Shane, 2003). However, more recently, Chwolka and Raith (2012) state that the BP is a valuable tool for evaluating the decision to enter or not into the market. These authors demonstrate that BP is actually very important as businesses that are not planned fail more than the ones that are planned (Chwolka and Raith, 2012). But this statement is not as straight forward as it would seem, as other authors have consistently stated BP is undermining for the entrepreneurs' creativity, being a work of fiction that can lead to disaster if followed too strictly (Jones and Penaluna, 2013). Lange et al. (2007) actually state that BP has little effect on the new ventures success, unless there is a need for funding.

We propose to contribute for such debate by assessing the importance of BP in entrepreneurship education and practice. Specifically, we evaluate former entrepreneurship students' perception on the usefulness of BP skills and tools that were obtained while attending the course. Our purpose is to clarify the existing discussion

and help set best-practices for teaching entrepreneurship that might lead to the success of new businesses.

For reaching this goal, we survey former students of a formal entrepreneurship master degree who, at the present time, have distinct professional profiles: full time students, alumni that are employed in companies, and entrepreneurs. We seek to understand what are these individuals' perceptions regarding the way their formal education based on BPs impacted on their professional lives.

Since extant literature emphasizes that cultural settings have a direct influence on the benefits of BP, given that cultures known to have higher uncertainty avoidance are considered to benefit less from the whole process (Brinckman et al., 2010), we decided to focus on a single country, Portugal, well renowned by the very high uncertainty avoidance of its citizens (Wursten and Lanzer, 2012), and a single master programme, MIETE (Master in Innovation and Technological Entrepreneurship).

In methodological terms, we surveyed all the students enrolled in eleven editions of MIETE (from 2004/2005 until 2014/2015) by direct, online survey using Limesurvey platform. Based on 84 responses (almost 40% response rate), we assess the determinants of the perceived importance of BP resorting to logistic econometric models.

In terms of structure the present dissertation is organized as follows. The next section presents a literature review on BP, entrepreneurship education and the relation between BP and entrepreneurship education. Section 3 details the methodology. The empirical results are presented and discussed in Section 4. The Conclusion highlights the main outcomes and limitations of the present study, and points several paths for future research.

2. Literature review

2.1. Discussing the concept of business planning

2.1.1. What is a business planning/business plan (BP)?[1]

Castrogiovanni (1996) defines it as the action of gathering information on a business opportunity in order to create an organization to exploit the opportunity whereas according to Chwolka and Raith (2012: 385) BP is "the outcome of a completed business planning process" and does "not (...) necessarily yield a document to prove it".

Sahlman (1997) divides the BP into 4 major dimensions: the people, the opportunity, the context, and risk and reward. There are two potential uses for the BP (Chwolka and Raith, 2012): 1) a part of the initial creative process, used to compute the chances of survival and profit margins; and 2) a form of evaluation of the business opportunity, becoming a basis for strategic decision. The second use of the BP allows the entrepreneur to avoid poor start-ups, but its efficacy depends on the quality of planning and the type of venture.

Brickmann, Grichnik and Kapsa (2010) also agree that the quality of the plan is vital, recommending entrepreneurs to avoid informal and unstructured planning over formal and sophisticated plans. Because of this, and according to the authors, it is more adequate for the small established firms to plan appropriately, as they already have information on prior operations and processes, whereas new small firms have to carry out their planning without that information and structures.

2.1.2. Why should entrepreneurs put together business plans?

Some researchers argue that BP is important in helping the entrepreneurs making decisions and to collect information. Chwolka and Raith (2012) argue that BP is essential to follow up good business ideas and to 'kill' ideas that are not likely to succeed. Brinckmann et al. (2010) mention in their work that the lack of quality of information may be connected to the poorer performance of the BP: if the information

[1] Even though some studies and reference websites (e.g., http://articles.bplans.com/business-model-vs-business-plan-vs-business-planning/ or http://www.forbes.com/sites/jimblasingame/2011/06/10/difference-between-business-plan-planning/#517078d2a7c7) refer to the difference between business plans and the act of business planning, most of researchers refer to both as the same thing (see Delmar and Shane, 2003; Honig, 2004; Chwolka and Raith, 2012). In short, business planning as the act of putting together business plans.

in which it is based on is better, the performance measures of the BP will be better. According to Shane and Delmar (2003), the entrepreneurs who complete their BPs before going to the market have a lower risk of termination than others who did not.

It is widely publicized that a vast share of entrepreneurs who have written a formal BP admitted that their actual businesses are quite different from the initial projects (Zacharakis, 2010). Albeit BPs may be seen as a static document, some authors, such as Nicholls-Nixon et al. (2000), consider it as a dynamic strategic change tool. These authors highlight that the changes in strategy are a consequence of a trial-and-error learning process. Due to lack of information and history of the environment, in all major decisions of the entrepreneurs/ managers make experiments while taking decisions (Nicholls-Nixon et al., 2000). This experimentation is important as it prepares the entrepreneurs/managers to improvise while the environment changes; entrepreneurs who stick to the initial plan are less able to adapt their decisions to the new situations (Nicholls-Nixon et al., 2000).

Summarizing the extant literature, Figure 1 represents the conections between building a BP and the success of business venturing in entrepreneurship. In other words, it depicts the way the role of the BP in the creation of new business ventures (Castrogiovanni, 1996) and the way it is used as a strategic analysis tool (Nicholls-Nixon et al., 2000) with a great level of pivoting and experimentation. It also illustrates the specific roles of the BP in the creation of new firms (Chwolka and Raith, 2012).

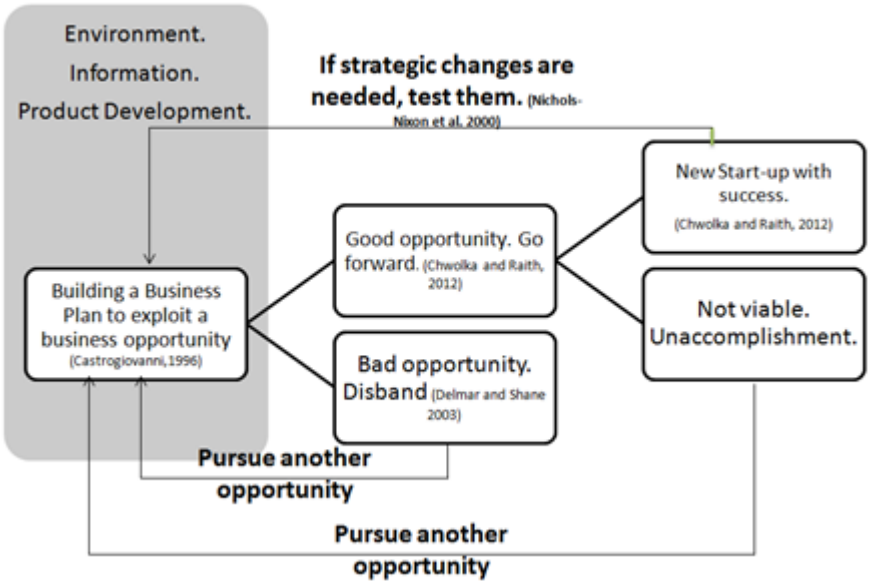

Figure 1: The role of business plans in entrepreneurship

Source: Own elaboration.

Even though a large number of researchers see the BP as a useful tool for the nascent entrepreneurs, its use is actually quite polemical. Apart from the examples already shown, Honig and Karlsson (2004) establish that entrepreneurs plan because they are expected to or because they want to imitate the existing companies and not because they will profit from it. These authors are quite critical regarding BP, as their work found, no link between profitability of the organization and the writing of the BP.

2.2. Entrepreneurship education

The Global Entrepreneurship Monitor (GEM, 2014) highlights several barriers to entrepreneurship and the creation of new businesses, namely the lack of education, cultural barriers, and lack of capital. Agreeing that knowledge and good quality information is critical for a sound BP, some researchers (e.g., Kourilsky and Walstad, 2002; Brinckmann et al., 2010) further show that one of the major perceived obstacles of entrepreneurship is the lack of knowledge and specific understanding.

Nevertheless, back in the 1990s, Hynes (1996) was already questioning whether entrepreneurship education (E-Ed.) really works or not. Pardo (2013) studied the E-Ed. goals and concluded that the methods should vary according to the wanted outcome. The gap between what is taught in E-Ed. and what entrepreneurs actually do was also addressed by Fayolle (2013).

According to existing literature reviews (e.g., van der Sluis and van Praag, 2008), most of the existing studies reporting the impact of education on the economy usually focus on schooling and wages of employees. They further posit that education also contributes to the success of new firms, meaning either their survival, earnings or growth (van der Sluis and van Praag, 2008). According to van der Sluis et al. (2008), formal education has an effect on education as it can be seen as a rated investment with a return of 6.1% per year, but education *per se* does not have an impact on chosing entrepreneurship as a career (van der Sluis et al., 2008). This literature, however, fail to account the issue os specific curricula and do not cover specific training and its effects.

One current major trend in formal education is E-Ed (Honig, 2014). When analysing literature reviews on E-Ed, we have come across with Rideout and Gray's (2013) work, which seeks to understand whether we can figure out, based on the existing E-Ed literature, if it works or not. After researching all existing articles that fit into the criteria defined by the authors, the researchers found only 12 studies - some examine

psychosocia outcomes of E-Ed whereas others have objective outcomes, such as self-employment or firm performance. According to their research, the existing studies state that the individuals who study entrepreneurship have a higher chance of starting their own businesses than people that major in other subjects. However, they also found that students that attend E-Ed already have higher entrepreneurial intents comparing to other students *before* their E-Ed.

According to Rideout and Gray (2013), based on the reviewed it is not possible to answer whether entrepreneurship education really works. The authors advice to focus instead on analysing the type of E-Ed, the target population and the institutions that offer E-Ed, and to whom E-Ed is effective.

Usually E-Ed, as it is supposed to be a very practical and hands on subject, appears to be based on traditions as opposed to academic research (Honig, 2004). However, there seems to be a gap in the literature regarding which specific tools and ways of teaching are more effective in pursuing the objective entrepreneurship goals (Honig, 2004; Rideout and Gray, 2013). This gap is also confirmed by Fayolle (2013) in his personal view on the future of E-Ed. In is work, he questions what is actually known about the relevance and appropriateness of the current practices in E-Ed. Piperopoulos and Dimov (2015) also mention the lack of consensus on what E-Ed includes and the fact that studies usually refer to E-Ed as 'an undifferentiated whole'.

2.3. Business plans in entrepreneurship education

Governments are encouraging the E-Ed and BP competitions (Russel et al., 2008), which enhances the importance of the BP in our days. According to Rideout and Gray (2013), there are two pedagogical approaches to E-Ed: the small business management programs and the entrepreneurial venture string. This latter stream of research has a major goal of producing a BP.

Piperoupolos and Dimov (2015) divide E-Ed into two classifications: the theoretical oriented programmes and the practically oriented programmes. BP, according to these authors, usually fits into the practically oriented courses.

Although teaching BP as a tool is based on tradition more than on research (Honing, 2004), because they are seen as a way to eliminate risk and guessing, by helping interpreting data, Jones and Penaluna (2013) believe that using BP as the main teaching and learning tool leads students to a trying to find a singular linear solution instead of

being able of understanding several diverse solutions and understand broad possibilities and change. Honig (2004) recognises that although the teaching of BPs are not sufficiently justified in research they are indeed used by several stakeholders, such as venture capitalists and banks, to assess the viability for investment. According to the same author, BPs are mostly a formality to the entrepreneur's network of friends, family, investors and to others in order to show that the new creation will be taken seriously.

While teaching BP as part of E-Ed is important, Jones and Penaluna (2013) point that it should be targeting only students who intend to pursue start-up activities.

There are in the literature multiple discussions and studies that cover the impact of education on entrepreneurship (see van der Sluis et al., 2008, for a review). Figure 2 provides an illustration of the main streams of literature on the issue. The impact of E-Ed, in its multiple forms and outcomes has also been addressed (Rideout and Gray 2013). Some studies (e.g., Rideout and Gray, 2013; Piperopoulos and Dimov, 2015) try to assess the outcomes of E-Ed in the creation of new businesses, using subjective and objective evaluations of the outcomes.

Some authors state that BP is fundamental for the future success of startups (Chwolka and Raith, 2012) whereas other authors acknowledge it as a waste of time (Delmar and Shane, 2003; Lange et al. 2007; Jones and Penaluna, 2013).

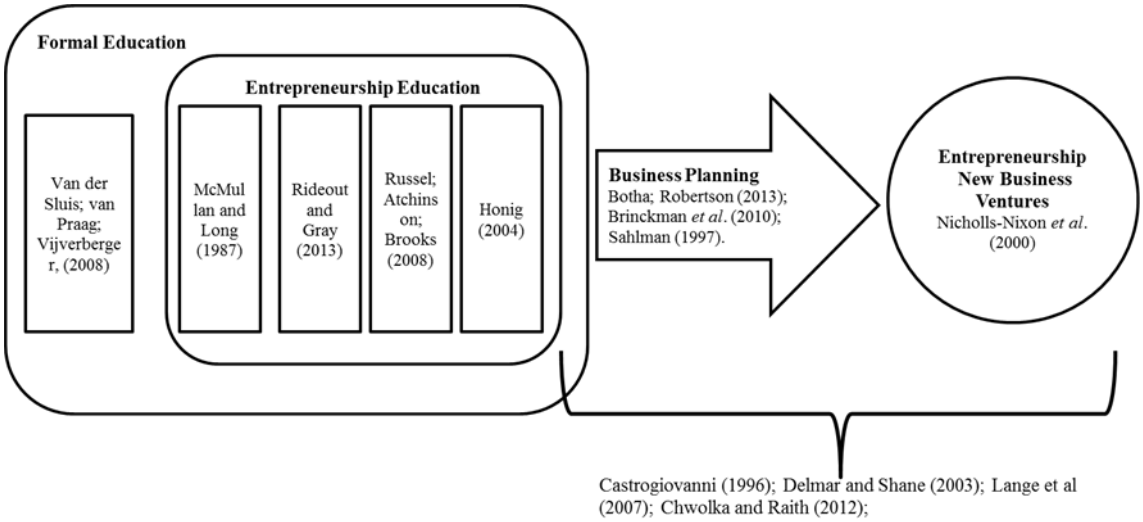

Figure 2: Entrepreneurship education, business planning and new venture creation
Source: Own elaboration.

But there are not many studies on the way BP is taught in E-Ed and its impact on the success of business creation (Honig, 2004). Fayolle (2013) argue that although course contents seem to be often based on the most popular textbooks, they are rarely based on

actual research or even entrepreneurial experience. Given the importance attributed to entrepreneurship, Edelman et al. (2008) inquire why is there so little about E-Ed's syllabus content.

2.4. Business plan tools and dimensions

In order to fully understand the perception of usefulness regarding business plans by former E-Ed attendants, it is key to understand what BPs are made of.

By undertaking a broad search on the internet, we uncovered several thousands of tips and articles regarding the possible content of a BP.[2] Some of these websites, such as *MindTools*[3] or *Simply Strategic Planning*,[4] and web-based magazine articles from, for example, *Entrepreneur magazine*,[5] suggest several tools to help set up the several chapters that compose a BP.

Combining the above mentioned web sources, including the popular website Entrepreneur,[6] with some mandatory reading of entrepreneurship courses (e.g., Sahlman, 1997, Hitec and Bygrave and Zacharis, 2011), we obtained the key dimensions of a BP (see Table 1).[7]

Table 1: Dimensions of a Business Plan

Dimension	Description
Company and Product/Service Description	Description of the business itself, product/service description, product/service advantages, technology description, production/operations plan, equipment needs, suppliers and partners, development plan and budget, location and physical evidence
Industry and Market Context – External Analysis	Description of the market and industry, external context such as political, economic and legal context, industry growth rate, issues of the industry.
Strategic Analysis	Market strategies, competition analysis, barriers to entry and to exit, positioning, strengths and weaknesses, mission, vision and values.
Marketing and Sales Plan	Sales potential, promotion plan, pricing, marketing mix, clients archetypes and typification, customer development strategy, distribution and channels
Team – Personnel and Management	Promoters' background and motivations, organizational structure, number of staff needed, skills and education, specific training needs
Financial Analysis	Preparation of metrics' plans or statements, such as financial, income, cash flow and balance sheet statements, capital requirements, overhead expenses, costs of goods sold
Risk Analysis	Description of critical risk that may cause the business not to succeed

Source: compilation of Sahlman (1997), Hitec (2004), Bygrave and Zacharakis (2011), Duarte and Esperança (2012).

[2] See https://www.google.com/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF-8#q=how%20to%20write%20a%20business%20plan.
[3] In https://www.mindtools.com/pages/ main/newMN_ STR.htm, retrieved 10th June 2016.
[4] In http://www.simply-strategic-planning.com/strategic-planning-tools.html, retrieved 19th June 2016
[5] In https://www.entrepreneur.com/article/246865, retrieved 19th June 2016.
[6] In https://entrepreneur.com/, retrieved 1st June 2016.
[7] We did a cross checking of the obtained dimensions by comparing them with the content existing in other books, namely Duarte and Esperança's (2012) book.

3. Methodological underpins

3.1. Combining qualitative and quantitative methodologies

In this study we seek to assess the way BP is taught in E-Ed and the perceived usefulness attributed to it by former E-Ed students (alumni) who have undergone through a formal E-Ed.

In order to achieve our goal, we resort to the case of MIETE, a 2-years master degree in Innovation and Technological Entrepreneurship, which uses BP as an educational tool, being jointly offered by the Engineering and Economics schools of University of Porto (Portugal) since 2004. MIETE is now in its eleventh edition, providing us a reasonable time span (over ten years) and number of individuals (more than two hundreds) to serve as a basis of our study.

We combine qualitative exploratory research (Saunders et al., 2009) with quantitative methods (Shirish, 2014) which permit a broad understanding of the historical context of MIETE, its syllabus structure and foundations, as well as solid assessment of alumni's perceived usefulness of the BP approach. The preliminary and exploratory qualitative research allowed us to set up a questionnaire that was sent out to the target population. The survey data constitutes the basis for testing, in a quantitative manner, the main hypothesis and potential connections between the relevant variables.

We started by assessing what was formally (i.e., in terms of course's content) MIETE's past experience using BPs. Then, we collected information (through personal interviews with MIETE's Director and teaching staff who were directly involved in majors related to BPs) about how learning was implemented. Finally, we interview some former MIETE's students to grasp how knowledge acquired throughout the course on BP has been useful for the professional life of the alumni. This latter procedure is in line with Rideout and Gray's (2013) recommendations which underline the importance of understanding (besides the outcomes of the E-Ed) the personal characteristics and previous knowledge of the E-Ed students in order to be able to have an unbiased perspective of the objective outcomes of E-Ed. We account for the heterogeneity of alumni by considering both entrepreneurs (those who have set up businesses) and those who have followed other career paths. This allows us to better understand which might be the most effective tools that the nascent entrepreneurs can acquire through their formal E-Ed.

3.2. Data gathering procedures

The data gathering process was based on a three stages: 1) documental phase, in order to build a context behind the MIETE degree; 2) personal interviews to key MIETE partakers (director, teaching staff, and former students), in order to understand the main issues on BP development and acquisition; and 3) online survey targeting all MIETE's alumni.

3.2.1. First phase (February-May 2016): documental enquiry

The first phase comprised the analysis of existing documentation, reports, videos and audio recordings about the master degree structure (1 month, February 2016), as well as personal conversations with the director of MIETE (João José Pinto Ferreira)[8] about the degree's history (see Table 2).

Table 2: Personal interviews – first phase

Interviewee	Purpose	Day/time	Length of the interview (hours)
João José Pinto Ferreira	Set the history of MIETE	09th March 2016	1h45
João José Pinto Ferreira	Clear doubts and understand choices regarding the programme	18th May 2016	1h00

3.2.2. Second phase (February-April 2016): interviews to key MIETE's participants

In the second phase we implemented the interviews with the teaching staff responsible for lecturing the BP related courses as well as two former alumni different professional backgrounds, getting a first grasp on alumni's perspective (see Table 3).

Table 3: Personal interviews – second phase

	Interviewee	Purpose	Day/time	Interview length (hours)
Alumni	Paulo Ferreira Santos	Entrepreneur – Alumnus. Understand usefulness perception of BP after MIETE. Exploratory interview as foundation for the survey.	29th February 2016	2h30
	Teresa Dieguez	Alumnus. Understand usefulness perception of BP after MIETE. Exploratory interview as foundation for the survey.	14th April 2016	1h36
Lecturers	José Miguel Oliveira	Former Lecturer. Understand context behind the choice of Business Planning in MIETE. *Courses:* Business Construction Project; Business Construction; Implementation Project.	18th March 2016	1h20
	Pedro Peixoto	Current Lecturer. Understand context behind the choice of Business Planning in MIETE. *Courses:* Startups' Strategy; Business Construction Project.	24th March 2016	2h00
	Alexandra Xavier	Founder of MIETE. Lecturer. Understand context behind the choice of Business Planning in MIETE. *Courses:* Project for Opportunity Identification and Evaluation; Business construction project	31st March 2016	1h20

[8] João José Pinto Ferreira is Associate Professor at the Engineering School (University of Porto) and was MIETE's founder, continuing, since its genesis, to act as MIETE's Director. More information in his personal web page: https://paginas.fe.up.pt/~jjpf/Homepage_-_Joao_Jose_Pinto_Ferreira/Welcome.html.

3.2.3. Third Phase (May 2016): online survey to MIETE's alumni

Based on MIETE's structure, curricula, contents and history, we set up a provisional survey for the former students. We then implement the survey into an online platform, Lime Survey.

Based on the university's intranet system, *Sigarra*,[9] we got the list of students that were enrolled in MIETE over its editions. With the collaboration of the supervisor of this author's thesis, Aurora Teixeira, the email contacts of virtually all students were collected and the survey (see Appendix A) and the first version of the survey was sent out to 3 students as a test version, on the 3rd May 2016. This test version and the respondents feedback was used to correct minor spelling mistakes and formatting errors.

After the corrections were made, the survey was sent out on the 6th of May 2016 to 214 alumni, by email. The survey was made available until the 31st of May 2016.

The survey was written in two versions: Portuguese and English. All respondents have had access to both languages, available as an option on the survey webpage, but the email language was previously chosen before sending out the link to all the participants.

Throughout the month of May, 48 personalized emails were sent out to the alumni to kindly ask them to participate on the survey. We also sent weekly automatic reminders, in a grand total of 400 emails, to all the contacts that had not answered the survey by then kindly reminding them to fill in the questionnaire. On the 31st May 2016, out of the 214 potential participants, the survey had received 84 valid answers.

The survey

The survey was divided into 4 sections/blocks of questions.

The first section included a question regarding several ***tools*** used often as part of the act of BP and asked the Alumni participants whether those tools were taught at MIETE. The survey also questioned the Alumni on how they perceived the usefulness of those tools for/in their professional lives.

The second section included questions regarding the several ***dimensions*** of the BP: whether they had been taught at MIETE or not and how useful they were/are in/for respondents' professional life after MIETE.

[9] In https://sigarra.up.pt/feup/pt/web_page.inicial.

The third section included an open question regarding the master's degree: the perception of the Alumni regarding what might have been missing in the learning process of MIETE.

The forth block of questions in the survey was focused on personal and demographic questions. These questions enable us to build the profile of each respondent and control for their influence when studying the determinants of perceived usefulness of the tools and dimensions of the BP. Questions were related to Alumni's background: entrepreneurial status (i.e., whether they had created of companies after attending/ concluding MIETE; professional experience (in years); academic background (type of undergraduate course they attended: Economics, Management, Engineering, etc.); enrolment status (whether they had concluded, interrupted, quitted or were still attending MIETE); age, and nationality.

The target population: MIETE's alumni

The master programme started in 2004-2005 with 9 students, of which 7 finished the full programme and 2 stopped it before finishing the whole academic process. The number of students evolved and reached the maximum amount (27) in the edition 2011-2012 (see Figure 3).

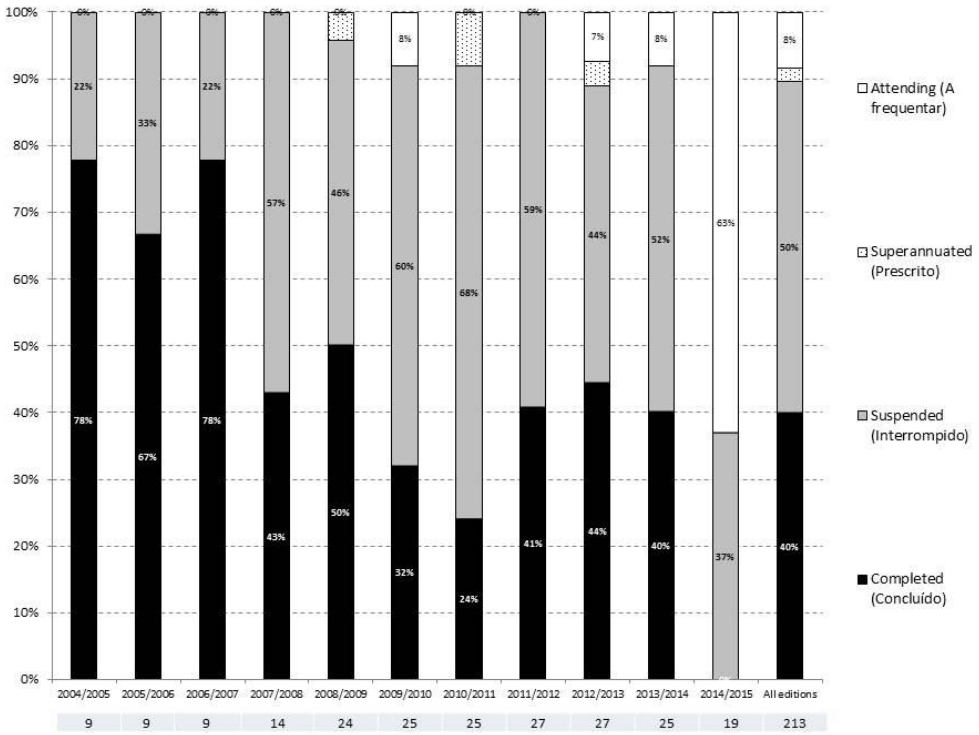

Figure 3: Students of MIETE by enrolment status (% and number)
Source: Own computations based on data available in Sigarra.

Considering all the editions (see Figure 3), we conclude that more than half of the students enrolled suspended or superannuated their participation in MIETE. Only 40% managed to conclude the degree. Those that are still attending the vast majority are students that enter in MIETE in 2014/2015 and are currently in their dissertation period, being expected to terminate their studies in 2016. Over time there seems to be a trend of decline in the percentage of students that managed to finish the full programme, with an all-time low reached in 2010-2011, when only 24% of the enrolled students finished MIETE (Figure 3).

3.3. The theoretical framework and the econometric specification

Based on the literature review and the context, we can argue that the usefulness perception regarding BP may be a function of a set of determinants that will help explain the perception of usefulness (or lack of) for the Alumni who attended formal business-plan-based entrepreneurship education.

$$\text{Business Plan Tools/Dimensions perceived usefulness} = f\left(\begin{array}{l}\underbrace{\text{Entrepreneur; Professional\_Exp; Academic\_Background;}}_{\text{background}} \\ \underbrace{\text{Edition\_MI ETE; Status\_MIETE;}}_{\text{MIETE}} \\ \underbrace{\text{Age; Nationalit y}}_{\text{Demographics}}\end{array}\right)$$

These determinants are based in several measurable variables, derived from the online survey implemented.

The type of specification that fits our 'theoretical model' the best way is a multivariate econometric specification. Our dependent variable is binary, assuming the value 1 when the Alumni attributes high importance (8 to 10 in a Likert scale of 1 to 10) to the tools/dimensions of BP taught at MIETE for her/his professional career and zero otherwise. Given the (binary) nature of the dependent variable, the most adequate econometric model is the multivariate logistic regression. The following equation summarizes the logistic regression that we use.

$$P(Perceived\_Usefu\ln ess) = \frac{1}{1+e^{-Z}};$$

$$with\ Z = \beta_0 + \underbrace{\mathbf{\beta_1} Entrepreneur + \beta_2 \Pr ofessional\_\exp + \beta_3 Academic\_Background\_engineering}_{background} +$$

$$+ \underbrace{\beta_4 Edition + \beta_5 InterruptedMIETE + \beta_6 ConcludedMIETE}_{MIETE} + \underbrace{\mathbf{\beta}_7 Age + \beta_8 Nationality}_{Demographi cs} + \varepsilon_i$$

By re-writing the equation of the logistic model in terms of the logarithm of the odds, we obtain the following logit model:

$$\log\left(\frac{\Pr ob(Useful)}{\Pr ob(NotUseful)}\right) = \beta_0 + \underbrace{\boldsymbol{\beta}_1 Entrepreneur + \beta_2 Pofessional\_\exp + \beta_3 Academic\_Background}_{background} +$$
$$+ \underbrace{\beta_4 Edition + \beta_5 InterruptedMIETE + \beta_6 ConcludedMIETE}_{MIETE} + \underbrace{\boldsymbol{\beta}_7 Age + \beta_8 Nationality}_{ldemographics} + \varepsilon_i$$

4. Empirical results

4.1. Qualitative and explorative analysis

4.1.1. The history of MIETE

According to Piperapoulos and Dimov (2015) in order to assess the impact of entrepreneurial education (E-Ed) it is important to understand the context of the entrepreneurial course offered.

The Master in Innovation and Technological Entrepreneurship, known as MIETE, is an officially recognized academic degree jointly offered by the Engineering (FEUP - Faculdade de Engenharia da Universidade do Porto) and Economics Schools (FEP – Faculdade de Economia da Universidade do Porto), of University of Porto, Portugal.

Although in Portugal there are several courses and degrees that include entrepreneurship in their curricula (see Santos et al., 2013), MIETE is the only course comprising a 2 years master in Entrepreneurship and Innovation. MIETE educational proposal is strongly based on BP tools and dimensions.

> "*Myself and Alexandra [Xavier] participated on the Cohitec programme, made available by the COTEC PORTUGAL Institution, in 2004. We thought that the programme was so interesting that we decided to propose a post-graduate degree in FEUP, which we did with a partnership of an American university. We called it, initially, the Tec Sequence, which was strongly based on the technology commercialization strategies proposed by North Caroline University*."
>
> (João José Pinto Ferreira, MIETE's director, 9th March 2016)

MIETE started in September 2004 and has had 11 editions so far. It began with a partnership with North Carolina State University (USA). MIETE followed their methodology for technology commercialization and offered complementary courses on business development and other elective courses, which allowed students to complement their background with the courses that suited them better, chosen by the students according to their perceived needs.

In its first edition MIETE was called "Master in Innovation and Technological Entrepreneurship in Engineering" and the major subjects were called "Project in Lab". In the second edition the designation of the master and the core subjects changed. The Master maintained its acronym but the designation lost the words "in Engineering", and the two core subjects became "Project 1" and "Project 2". Although the designations

were changed, the structure of the curricular units and the philosophy of the course was kept the same.[10]

At that time the main focus of MIETE was on two subjects: "Technological Project developed in Lab" and "Evaluation and Technology Commercialization", both with bi-annual evaluation, and followed, on the third semester, by a subject called "Implementation Strategies for Technology Commercialization". These two main subjects were taught based on Business Plan tool. BP tool was taught and applied to business opportunities found within the University, based on technologies and patents developed within the Faculty of Engineering.[11]

From the first edition of MIETE emerged two start-ups, *Ideavity*, launched in 2006, and *Tomorrow Options* (nowadays called *Kinematix*), launched in 2007.[12] *Ideavity* won the first prize of the Business Plans Ideas Contest from NET / ADI 2005.

> "*We started Tomorrow Options, which is now called Kinematix, as a consequence of the MIETE degree. We interviewed several researchers as a part of one of the courses and ended up developing a project related with sensors. We spent a lot of time working on a Business Plan both in MIETE and after MIETE and the business suffered a lot of changes through time, but it was either way a «MIETE business»".*
>
> (Paulo Santos, MIETE's alumni, 29th February 2016)

In October 2006 there were changes in the structure of MIETE in order to meet the Bologna requirements. The seminars that were held in the original programme were extended and organized into formal courses: The two core subjects changed names and became less focused on tutoring and more based on lecturing.[13] The courses were mapped according to the National Content Standards for Entrepreneurship Education. This process led to a major change in their contents.

The optional subjects were replaced by mandatory subjects related with tools that were seen as important for the entrepreneur. There were still a hands-on subject in the first semester called "Introduction to entrepreneurship", and the second and third semesters kept the same structure as before but now the subject were named "Project for

[10] Information gathered from the brochure "Mestrado em Inovação e Empreendedorismo Tecnológico" – 2005, Faculdade de Engenharia da Universidade do Porto.
[11] Information gathered from the brochure "Mestrado em Inovação e Empreendedorismo Tecnológico em Engenharia" – 2004, Faculdade de Engenharia da Universidade do Porto.
[12] *Tomorrow options* is a technology based startup that sells gadgets for sports and health. When the company was launched its core business was the development and sale of medical devices for orthopaedic prosthesis. It changed name to *Kinematix* in 2016 as a company selling a wearable gadget for athletes. *Ideavity* was initially launched as a web developer company that created a social network for teenagers.
[13] Information gathered from the brochure "Mestrado em Inovação e Empreendedorismo Tecnológico" – 2006, Faculdade de Engenharia da Universidade do Porto.

Opportunity Identification" and "Business Construction Project". All the subjects were strongly based on the Business Plan tools.

> "*In 2006 we had the need to change the structure of MIETE and make it more structured and systematic, according to Bologna requirements. Some of the elective courses were replaced by mandatory courses that provided a more rigid programme and methods and that allowed us to be an official recognized /accredited Master Dregree.*"
>
> (João José Pinto Ferreira, MIETE's director, 9th March 2016)

In 2007 took place an Advisory Board meeting. The Advisory board was composed of business people from Portugal and international academics and consultants, from different backgrounds, and its purpose was to discuss the best practices regarding Entrepreneurship Education in the specific form of MIETE and its outcomes.[14]

In 2008 MIETE was recognized as a good example by a European Commission's report (EC, 2008). Also in that year, a new MIETE Alumni's company was launched, Ownersmark SA, which closed in 2010.[15] The company received prizes for its product *Polight*, developed within a partnership with the Engineering school (FEUP) of University of Porto.

In the following years several startups emerged and eventually ceased: the social project *Construir* started in 2009 (and closed in 2013), whereas *Metablue* and *Scootzz* were launched in 2011.[16]

In 2013/2014, the master was subject to an External Evaluation by the *Agência de Acreditação e Avaliação do Ensino Superior* (A3SS) that made a report with several suggestions for change in MIETE's curriculum structure and syllabus (AAAES, 2014).

The core subjects related to project/BP tools - Introduction to Entrepreneurship, Project for Opportunity Identification and Business Construction Project - were kept but some complementary majors/subjects were changed to meet the A3SS' suggestions and requirements.[17] One of the remarks made by the A3SS (AAAES, 2014) was that only 30% of the teaching load was provided by full time staff. By that time, of the 15 faculty

[14] Personal communication by João José Pinto Ferreira, MIETE, 09 March 2016.
[15] *Ownersmark SA* produced light poles for street lamps made of resistant and sustainable materials.
[16] The *Construir Project* was the first social project that emerged from MIETE - it was set to help disabled children to have an hobby by building replica's of important Porto buildings our of Lego blocks. The *Metablue* company is a medical devices company, that produces a device that can identify hear infections. *Scootz* develops electrical eco-efficient mobility solutions, such as electrical motorcycles.
[17] Based on the brochure "Mestrado em Inovação e Empreendedorismo Tecnológico" – 2015, Faculdade de Engenharia da Universidade do Porto.

teaching staff, only 5 had a 100% dedication for more than 3 years, and only 8 had PhD (5 of them in the field of studies of the master degree). The committee recommended that the number of teachers with entrepreneurship and innovation background should increase, as well as the number of full time teachers. The committee also suggested the introduction of subjects related to quantitative methods and research methods, as well as an increase the technologically based subjects and disciplines/subjects whose content include economics, law and financial matters, and intellectual property commercialization.

> "*One of the strongest recommendations of the A3SS board was to introduce quantitative methodologies in our degree's programme. This recommendation, as well as the other ones received, forced us to make another pivot programme and to introduce new courses, as well as to cut on existing ones. These changes included reinforcing the financial and project analysis components of the curricula. Being a formal master degree, MIETE has to have formal and structured curricula."*
>
> (João José Pinto Ferreira, MIETE's Director, 9th March 2016)

> "*We cannot forget that MIETE is not an acceleration or incubation programme. It is a master degree and it requires structure, curricula, programme. The business plan is a good conducting line for entrepreneurship: it allows us to cover important subjects that the students need to know if they want to be entrepreneurs and provides a streamline for the courses themselv*es".
>
> (Alexandra Xavier, MIETE's lecturer, 31st March 2016)

4.1.2. BP tools and dimensions and MIETE's structure and syllabus

Even though the master degree suffered several changes throughout the years, there were always cross-year subjects based on BP and strategy: *Project for Opportunity Identification and Evaluation* – taught from 2008 up to today (July 2016), complemented by *Business Creation and Development* - from 2008 to 2013/2014 – and *Startups' Strategy* from 2014 to today (July 2016) – and *Business Construction Project* – taught from 2008 to today (July 2016) – complemented by another course on the same semester – *Business Creation* from 2008 to 2013/2014, and *Finances and Investment Projects' Analysis* since 2014 (see Table 4). Before 2008, the BP was taught in a modular fashion, with seminars being held throughout what was called the *TEC Sequence* – 3 seminar based subjects held throughout the first 3 semesters of the degree.

The lecturing of BP was divided into theoretical subjects based on the several dimensions of the BP, such as the *TEC Sequence* (between 2004 and 2008), *Marketing Managemen*t, from 2008 to today, *Business Construction and Development*, from 2008

and 2013/2014, *Business Construction*, from 2008 and 2013/2014, *Finances and Investment Projects' Analysis* (from 2014 to today); and 'hands-on' subjects such as the *Lab Based project*, from 2004 to 2008, *Project for Opportunity Identification and Evaluation*, from 2008 to today, and *Business Construction Project*, from 2008 to today, based on practical cases and setting up real entrepreneurial ventures.

Table 4 summarizes the degree's programme and its major changes throughout the years. The main change was felt between the first set of editions that were held between 2004 and 2008 and the subsequent editions. The first set was based on several elective courses that were chosen by the students according to their perceived needs. The "fixed" courses were called part of the *TEC Sequence* and were based on seminars and hands-on projects. With the need to implement the Bologna adaptation process, as described in Section 3.2.2, the degree's programme was set into more mandatory courses. The second main change, even though it was not as deep as the first change, set up a new range of mandatory courses that were recommended by the certification committee. From the existing mandatory 11 courses, 6 courses were kept and 8 new courses were created.

The major subject where BP was taught was *Business Construction Project*. This subject was lectured by two people with very different backgrounds. The 2008-2013 editions' course was lectured by José Miguel Oliveira and the 2014-2016 editions'were taught by Pedro Peixoto.

According to the information provided personally by the two lecturers, José Miguel Oliveira[18] comes from an Audit and Merges and Acquisitions background, with a Finances academic background. He had not created any firms by the time he was teaching the courses and his business planning experience came mostly from his M&A experience, evaluating potential business investments on the investors' side.

Pedro Peixoto[19] has a very different background: he has an engineering academic background and, by the time he started lecturing his courses, he had had at least 3 companies, even though he said that they were not particularly innovative or "startup-ish".

[18] Interview made on the 18th March 2016.
[19] Interview made on the 24th March 2016.

Table 4: Evolution of the MIETE's course structure since its inception until 2016

Semester	4 years period	5 years period	2 years period
	2004/2005; 2005/2006; 2006/2007; 2007/2008	**2008/2009 to 2013/2014***	**2014/2015 and 2015/2016**
1ST YEAR, 1ST SEMESTER	Evaluation and Technology Commercialization (Part of the TEC Sequence)	Marketing Management	Marketing Management
	Technological Project developed in the Lab / Innovation and Technology Project 1	Introduction to Entrepreneurship	Introduction to Entrepreneurship
		New Product and Services Development	New Product and Services Development
		Criativity	Introduction to Accounting and Finances
			Techology Commercialization
	Option 1	Option 1	Option 1
	Option 2	Option 2	
1ST YEAR, 2ND SEMESTER	Technological Entrepreneurship (Part of the TEC Sequence)	Project for Opportunity Identification and Evalutation	Project for Opportunity Identification and Evalutation
	Technological Project developed in the Lab/ Innovation and Technology Project 2	Managing Innovation	Managing Innovation
		Business Creation and Development	Startups' Strategy
		Organizational Behaviour and Leadership	Market studies
			Quantitative Methods
	Option 3	Option 3	Option 2
	Option 4		
2ND YEAR, 1ST SEMESTER		Business Construction	Finances and Investment Projects Analysis
	Implementation Strategies for Technology Commercialization (Part of the TEC Sequence)	Business construction project	Business construction project
	Thesis (Annual)	Thesis (Annual)	Business Law
			Research Methods
		Option 3	
2ND Year, 2nd semester	Thesis (Annual)	Business Implementation Project	Thesis (Semester)
		Thesis (Annual)	

Notes: * Even though the edition 2013-2014 started to be lectured with the structure that is presented here, all students were offered the possibility to transition to the most recent degree structure and to attend the new courses (information collected in personal communication, by MIETE's Director, Professor João José Pinto Ferreira).
The grey cells identify the subjects associated directly to BP tools and dimensions.

4.2. Quantitative analysis

4.2.1. Representativeness of the sample

All the editions are represented in the respondent sample, as illustrated in Table 5. The global rate of response was 39.4%, which is a quite good response rate for a noncompulsory survey. The sample obtained, however, is not completely representative of the population with some editions being under represented (2009/2010 and 2010/2011) whereas others are overrepresented (2005/2006; 2012/2013; 2014/2015).

The over representativeness of the 2014/2015 edition might in part be explained by being the edition where the author of the present thesis is enrolled.

Table 5: Representativeness of the respondent sample by edition

Edition	Population	% Population	Sample	% Sample
2004/2005	9	4.2	3	3.6
2005/2006	9	4.2	8	9.5
2006/2007	9	4.2	4	4.8
2007/2008	14	6.6	4	4.8
2008/2009	24	11.3	8	9.5
2009/2010	25	11.7	4	4.8
2010/2011	25	11.7	5	6.0
2011/2012	27	12.7	9	10.7
2012/2013	27	12.7	17	20.2
2013/2014	25	11.7	9	10.7
2014/2015	19	8.9	13	15.5
All	213	100.0	84	100.0

Note: Light grey cells identify the editions that are underrepresented in our sample whereas the darker grey cells identify the over represented editions.

4.2.2. Descriptive results

The Business Plan tools: Were they taught?

The percentage of respondents that state to remember that the selected BP tools were lectured is quite high: in 10 out of 12 tools, that percentage is higher than 90% (see Table 6). In the case of the BP tools *Marketing Mix*, *SWOT analysis*, *Porter's Five Forces*, and *Income Statements* practically 90% or more of the respondents asserts that they were taught. In contrast, only 52% of the respondents admitted that the *"Finicia" Excel File* was taught.

Table 6: Business plan tools taught – number and percentage of respondents who answered "It was taught"

	Do not remember (no.)	No (no.)	Yes (no.)	Do not remember (%)	No (%)	Yes (%)
Value Proposition Canvas	**7**	12	65	8.3%	14.3%	77.4%
Business Model Canvas	**5**	11	68	6.0%	13.1%	81.0%
Mission, Vision and Values	**7**	6	71	8.3%	7.1%	84.5%
External Analysis- PEST or PESTEL	**8**	16	60	9.5%	19.0%	71.4%
Income Statements	**5**	5	74	6.0%	6.0%	88.1%
Cash flow statements	**9**	8	67	10.7%	9.5%	79.8%
Balance Sheet	**5**	7	72	6.0%	8.3%	85.7%
"Finicia" Excel File	**22**	18	44	26.2%	21.4%	52.4%
Financial and viability indicators	**12**	7	65	14.3%	8.3%	77.4%
SWOT analysis	**1**	5	78	1.2%	6.0%	92.9%
Porter's Five Forces	**3**	6	75	3.6%	7.1%	89.3%
Marketing Mix	**0**	5	79	0.0%	6.0%	94.0%

Although global averages are very high confirming that the selected tools have been taught in MIETE, it is important to assess the extent to which the assertion about being taught is dependent on some respondent's characteristics. Starting by the edition where the respondent was/is enrolled, when we analyse the differences in means (see Table 7), data shows that there is indeed some significant differences among editions regarding some tools, most notably the *"Finicia" Excel File*, the *Business Model Canvas*, the *External Analysis- PEST or PESTEL*, the *Income Statements* or the *Cash flow statements*. For all the latter tools the percentage of respondents from the earlier edition that asserts that the tools were taught is much lower than that of later editions. This indicates that, probably, some of these tools were taught only in a set of (later) editions.

Table 7: Business plan tools taught: differences in means by edition

	All	Before 2008/09	Between 2008/09-2012/13	2013/14 and 2014/15	Kruskal-Wallis test (p-value)
Value Proposition Canvas	77.4%	63.2%	76.7%	90.9%	0.108
Business Model Canvas	81.0%	47.4%	86.0%	**100.0%**	0.000***
Mission, Vision and Values	84.5%	78.9%	86.0%	86.4%	0.749
External Analysis- PEST or PESTEL	71.4%	63.2%	65.1%	**90.9%**	0.064*
Income Statements	88.1%	89.5%	88.4%	86.4%	0.952
Cash flow statements	79.8%	63.2%	81.4%	**90.9%**	0.084*
Balance Sheet	85.7%	78.9%	81.4%	**100.0%**	0.083*
"Finicia" Excel File	52.4%	15.8%	51.2%	**86.4%**	0.000***
Financial and viability indicators	77.4%	73.7%	76.7%	81.8%	0.818
SWOT analysis	92.9%	89.5%	93.0%	95.5%	0.761
Porter's Five Forces	89.3%	94.7%	86.0%	90.9%	0.574
Marketing Mix	94.0%	89.5%	95.3%	95.5%	0.635

Notes: The values in the table represent the percentage of the respondents who answered "It was taught".
*** (**)[*] statistically significant at 1%(5%)[10%].

Regarding the entrepreneurial status, fewer differences are worth registering (see Table 8). A very large percentage (over 90%) of the respondents that are entrepreneurs (i.e., who created companies after leaving MIETE) state that *Value proposition canvas* and *Cash flow analysis* have been taught, against 73% of the non-entrepreneurs. The opposite happens in the case of *Porter's Five Forces*, where almost all (94%) non-entrepreneurs claimed that it was taught whereas only 75% of the entrepreneurs affirm that it was taught.

Table 8: Business plan tools taught: differences in means by entrepreneurial status

	All	Entrepreneurs [Created companies after MIETE]	Non Entrepreneurs [Did not create companies after MIETE]	Kruskal Wallis test (p-value)
Value Proposition Canvas	77.4%	**91.7%**	72.6%	0.061*
Business Model Canvas	81.0%	83.3%	80.4%	0.762
Mission, Vision and Values	84.5%	83.3%	84.3%	0.915
External Analysis- PEST or PESTEL	71.4%	62.5%	74.5%	0.290
Income Statements	88.1%	91.7%	86.3%	0.506
Cash flow statements	79.8%	**91.7%**	72.5%	0.061*
Balance Sheet	85.7%	87.5%	86.3%	0.885
"Finicia" Excel File	52.4%	58.3%	56.9%	0.905
Financial and viability indicators	77.4%	70.8%	84.3%	0.176
SWOT analysis	92.9%	87.5%	94.1%	0.328
Porter's Five Forces	89.3%	75.0%	**94.1%**	0.018**
Marketing Mix	94.0%	91.7%	94.1%	0.693

Notes: The values in the table represent the percentage of the respondents who answered "It was taught".
*** (**)[*] statistically significant at 1%(5%)[10%].

The age group of the respondents also reveals some noticeable differences (Table 9), namely for the following tools: *Value Proposition Canvas, Business Model Canvas, Mission, Vision and Values, External Analysis- PEST or PESTEL*, and *"Finicia" Excel File*. The percentage of more senior respondents that state the tools were taught is significantly lower than the percentages associated with younger respondents. The differences are particularly accentuated in the case of *"Finicia" Excel File, Mission, Vision and Values,* and *Business Model Canvas.*

One could think it these differences would be related to the editions. However, the tools where we find significant differences are not exactly the same between the two variables (age and editions).

Table 9: Business plan tools taught: differences in means by age groups

	All	25-31 years old	32-40 years old	more than 40 years old	Kruskal Wallis test (p-value)
Value Proposition Canvas	77.4%	**87.0%**	84.4%	57.9%	0.043**
Business Model Canvas	81.0%	**95.7%**	81.3%	63.2%	0.029**
Mission, Vision and Values	84.5%	87.0%	**96.9%**	68.4%	0.017**
External Analysis- PEST ou PESTEL	71.4%	69.6%	**81.3%**	52.6%	0.099*
Income Statements	88.1%	87.0%	87.5%	89.5%	0.967
Cash flow statements	79.8%	82.6%	78.1%	73.7%	0.785
Balance Sheet	85.7%	82.6%	90.6%	84.2%	0.658
"Finicia" Excel File	52.4%	**78.3%**	53.1%	31.6%	0.010***
Financial and viability indicators	77.4%	69.6%	81.3%	84.2%	0.456
SWOT analysis	92.9%	95.7%	93.8%	84.2%	0.357
Porter's Five Forces	89.3%	78.3%	90.6%	94.7%	0.222
Marketing Mix	94.0%	91.3%	96.9%	89.5%	0.544

Notes: The values in the table represent the percentage of the respondents who answered "It was taught".
*** (**)[*] statistically significant at 1%(5%)[10%].

Regarding respondent's enrolment status, we observe (Table 10) that those who are still attending MIETE tend to assert to larger extent than the remaining respondent that *Finicia excel file* and *Business Model Canvas* have been taught in MIETE.

Table 10: Business plan tools taught: differences in means by enrollment status

	All	Suspended or superannuated	Attending	Concluded	Kruskal Wallis test (p-value)
Value Proposition Canvas	77.4%	82.4%	**93.8%**	70.6%	0.136
Business Model Canvas	81.0%	82.4%	**100.0%**	74.5%	0.078*
Mission, Vision and Values	84.5%	**88.2%**	81.3%	84.3%	0.857
External Analysis- PEST or PESTEL	71.4%	76.5%	**81.3%**	66.7%	0.469
Income Statements	88.1%	**94.1%**	93.8%	84.3%	0.417
Cash flow statements	79.8%	76.5%	**93.8%**	76.5%	0.306
Balance Sheet	85.7%	88.2%	**100.0%**	80.4%	0.143
"Finicia" Excel File	52.4%	41.2%	**93.8%**	43.1%	0.001***
Financial and viability indicators	77.4%	76.5%	**81.3%**	76.5%	0.920
SWOT analysis	92.9%	100.0%	**93.8%**	90.2%	0.397
Porter's Five Forces	89.3%	88.2%	**93.8%**	88.2%	0.816
Marketing Mix	94.0%	100.0%	**100.0%**	90.2%	0.183

Notes: The values in the table represent the percentage of the respondents who answered "It was taught".
*** (**)[*] statistically significant at 1%(5%)[10%].

When we look at the results of the variable "nationality" in Table 11, we can observe significant differences between the Portuguese and the non-Portuguese respondents regarding the tools *Business Model Canvas* and *PEST analysis* (in which the foreigners say "yes, it was taught" more often) and the Financial Indicators and Marketing Mix (which the Portuguese say that was taught more than the non-Portuguese). This can probably be explained by the fact that the amount of non-Portuguese students is greater in more recent editions of MIETE than in earlier editions.

Table 11: Business plan tools taught: differences in means by nationality

	All	Non-Portuguese	Portuguese	Kruskal Wallis test (p-value)
Value Proposition Canvas	77.4%	75.0%	77.8%	0.832
Business Model Canvas	81.0%	**100.0%**	77.8%	0.071*
Mission, Vision and Values	84.5%	83.3%	84.7%	0.903
External Analysis- PEST ou PESTEL	71.4%	**100.0%**	66.7%	0.019**
Income Statements	88.1%	75.0%	90.3%	0.133
Cashflow statements	79.8%	83.3%	79.2%	0.741
Balance Sheet	85.7%	83.3%	86.1%	0.800
"Finicia" Excel File	52.4%	66.7%	50.0%	0.287
Financial and viability indicators	77.4%	58.3%	**80.6%**	0.090*
SWOT analysis	92.9%	91.7%	93.1%	0.863
Porter's Five Forces	89.3%	91.7%	88.9%	0.775
Marketing Mix	94.0%	83.3%	**95.8%**	0.092*

Notes: The values in the table represent the percentage of the respondents who answered "It was taught".
*** (**)[*] statistically significant at 1%(5%)[10%].

When analysing the differences among the respondents with different academic backgrounds (see Table 12), the only significant difference occurs in the perceptions regarding the *Porter's Five Forces*: the respondents who have a Business background have a lower perception of it being taught than the ones from Engineering or other courses. This can possibly be explained by the fact that it is a very traditional tool in Business studies, being often taught at business degrees and that may lead to confusion on in which course it was taught.

Table 12: Business plan tools taught: differences in means by academic background

	All	Business	Engineering	Others	Kruskal Wallis test (p-value)
Value Proposition Canvas	77.4%	80.0%	73.7%	88.2%	0.475
Business Model Canvas	81.0%	80.0%	84.2%	76.5%	0.783
Mission, Vision and Values	84.5%	75.0%	89.5%	82.4%	0.367
External Analysis- PEST ou PESTEL	71.4%	70.0%	68.4%	76.5%	0.832
Income Statements	88.1%	95.0%	86.8%	82.4%	0.480
Cashflow statements	79.8%	80.0%	76.3%	82.4%	0.869
Balance Sheet	85.7%	85.0%	89.5%	82.4%	0.751
"Finicia" Excel File	52.4%	55.0%	50.0%	76.5%	0.185
Financial and viability indicators	77.4%	85.0%	76.3%	82.4%	0.710
SWOT analysis	92.9%	85.0%	94.7%	94.1%	0.407
Porter's Five Forces	89.3%	75.0%	**94.7%**	88.2%	0.092*
Marketing Mix	94.0%	85.0%	97.4%	94.1%	0.202

Notes: The values in the table represent the percentage of the respondents who answered "It was taught".
*** (**)[*] statistically significant at 1%(5%)[10%].

The last analysis was made to respondents with distinct professional experiences (see Table 13) and evidences significant differences among respondents regarding the tools *Income Statements*, of which 76.9% of the respondents with 4 to 9 years of professional experience saying it was taught against 96.0% of their less experienced counterparts (0 to 3 years of experience).

Table 13: Business plan tools taught: differences in means by work experience

	All	0-3 years	4-9 years	10 years or more	Kruskal Wallis test (p-value)
Value Proposition Canvas	77.4%	84.0%	84.6%	66.7%	0.224
Business Model Canvas	81.0%	92.0%	76.9%	75.0%	0.246
Mission, Vision and Values	84.5%	84.0%	92.3%	75.0%	0.254
External Analysis- PEST ou PESTEL	71.4%	72.0%	76.9%	62.5%	0.531
Income Statements	88.1%	**96.0%**	76.9%	**91.7%**	0.092*
Cashflow statements	79.8%	80.0%	80.8%	75.0%	0.869
Balance Sheet	85.7%	88.0%	84.6%	87.5%	0.930
"Finicia" Excel File	52.4%	64.0%	65.4%	41.7%	0.173
Financial and viability indicators	77.4%	84.0%	69.2%	87.5%	0.230
SWOT analysis	92.9%	96.0%	92.3%	87.5%	0.551
Porter's Five Forces	89.3%	88.0%	80.8%	95.8%	0.266
Marketing Mix	94.0%	92.0%	96.2%	91.7%	0.777

Notes: The values in the table represent the percentage of the respondents who answered "It was taught".
*** (**)[*] statistically significant at 1%(5%)[10%].

The Business Plan Tools: Perceived usefulness

Analysing the results for the perceived usefulness of the BP tools (see Table 14) we concluded that the tools that are considered most useful (i.e., that respondents attribute 8, 9 or 10 in a scale of 1-10, with 1 the lowest possible grade, not useful, and 10 the highest one, very useful) are (by decreasing order) *SWOT Analysis, Marketing Mix, and Business Model Canvas*, with more than half of the total respondents considering them very useful tools in their professional lives. In the other extreme, we have the tools *PEST or PESTEL, Balance Sheet,* and *Finicia Excel file*, with less than one third of the respondents recognising that they are very useful.

Although, in the overall, strategic tools are perceived as more important than the financial tools, which scored lower, only 29% of the respondents said that PEST analysis was useful. This latter tool describes a framework of macro-environmental factors - PEST/EL (Political, Economic, Social and Technological/Environmental, Legal) - used in the environmental scanning component of strategic management.

Table 14: Business Planning Tools – Ranking of perceived usefulness

	Entrepreneur?	MIETE Edition	Age groups	Status	Nationality	Academic Background	Prof. experience (years)	Global average*
SWOT Analysis	1	1	1	1	1	1	1	60.8%
Marketing Mix	2	2	2	2	2	2	2	52.6%
Business Model Canvas	3	3	3	3	3	3	3	52.1%
Value Proposition Canvas	4	4	4	4	4	4	4	48.6%
Mission, Vision, Values	5	5	5	5	5	5	5	46.7%
Income Statements	6	6	6	6	6	6	6	46.1%
5 Forces of Porter	7	7	7	7	7	7	7	41.2%
CashFlow Analysis	8	8	8	8	8	8	8	38.5%
Financial and Viability Indicators	9	9	9	9	9	9	9	34.7%
Finicia Excel file	10	11	10	11	11	10	10	31.6%
Balance Sheet	11	10	12	10	10	11	11	31.4%
PEST or PESTEL	12	12	11	12	12	12	12	29.2%

Note: * percentage of total respondents that consider the selected tool as very useful (8-10 in a scale of 0-10); the Table A1, in Appendix, details the averages by each category.

When we started to analyse the differences in means (Table 15) we noticed that, for the alumni that created companies after attending MIETE (entrepreneurs), the perception of usefulness of the financial tools, most notably the *Cash flow analysis* and *Balance Sheet*, is significantly higher than for the ones who did not created any company (non-entrepreneurs). The percentage of the entrepreneurs that find it useful is almost the double for these two tools than the percentage associated to the non-entrepreneurs. This

difference in perceptions may be linked to the actual use of these tools during the entrepreneurs' work experience.

Table 15: Business plan tools ' perceived usefulness: differences in means by entrepreneurial status

	All	Did not create firms after MIETE	Created firms after MIETE	Kruskal Wallis test (p-value)
Value Proposition Canvas	50.0%	51.2%	47.8%	0.798
Business Model Canvas	52.9%	55.6%	47.8%	0.549
Mission, Vision and Values	47.9%	42.9%	**59.1%**	0.209
External Analysis- PEST or PESTEL	30.4%	30.8%	29.4%	0.920
Income Statements	47.1%	41.3%	58.3%	0.179
Cash flow statements	39.4%	27.9%	**60.9%**	0.010***
Balance Sheet	31.4%	23.9%	**45.8%**	0.063*
"Finicia" Excel File	32.7%	34.3%	29.4%	0.728
Financial and viability indicators	34.8%	30.4%	45.0%	0.257
SWOT analysis	61.6%	58.8%	68.2%	0.454
Porter's Five Forces	42.0%	37.5%	52.4%	0.253
Marketing Mix	53.4%	50.0%	60.9%	0.390

Note: values indicate the % of respondent that perceives the items as useful or very useful (8 and more in a scale of 10);

*** (**)[*] statistically significant at 1%(5%)[10%].

The same type of differences happens among the respondents from the most recent editions, which consider the Cash Flow analysis and the Balance Sheet more useful than the respondents of earlier editions. Indeed, 63% of the respondents enrolled in 2013-2015 editions state that the *Cash-flow analysis* is very important in their professional lives, against 25% from the editions before 2008/2009. The *Balance sheet* is very useful for 55% of the respondents of the most recent editions, against only 17% of those from earlier editions (see Table 16). In contrast, in the case of the *Value Proposition Canvas*, its usefulness is higher for respondents enrolled in earlier editions (75% of them consider it very useful) than for those of most recent.

Table 16: Business plan tools ' perceived usefulness: differences in means by edition

	All	Before 2008/09	Between 2008/09-2012/13	2013/14 and 2014/15	Kruskal Wallis test (p-value)
Value Proposition Canvas	47.2%	**75.0%**	33.3%	50.0%	0.021**
Business Model Canvas	51.4%	57.1%	43.6%	61.9%	0.361
Mission, Vision and Values	45.5%	47.4%	42.1%	50.0%	0.834
External Analysis- PEST or PESTEL	27.4%	42.9%	26.7%	16.7%	0.261
Income Statements	44.7%	44.4%	35.9%	63.2%	0.150
Cash flow statements	37.5%	25.0%	29.7%	**63.2%**	0.027**
Balance Sheet	31.6%	16.7%	26.3%	**55.0%**	0.026**
"Finicia" Excel File	30.4%	22.2%	25.0%	42.1%	0.393
Financial and viability indicators	34.7%	42.9%	28.9%	40.0%	0.550
SWOT analysis	59.5%	68.4%	59.0%	52.4%	0.589
Porter's Five Forces	40.0%	42.1%	40.5%	36.8%	0.943
Marketing Mix	51.9%	55.6%	52.5%	47.6%	0.881

Note: values indicate the % of respondent that perceives the items as useful or very useful (8 and more in a scale of 10);

*** (**)[*] statistically significant at 1%(5%)[10%].

In what concerns the age group (see Table 17), only for the tool *Income Statements* there is evidence of significant differences in means, with a lower percentage (24%) of more senior respondents considering the tool as very useful for their professional lives, compared to a higher percentage (60%) of the respondents who are 32 to 40 years old or 47% of younger cohorts.

Table 17: Business plan tools ' perceived usefulness: differences in means by age group

	All	25-31 years old	32-40 years old	more than 40 years old	Kruskal Wallis test (p-value)
Value Proposition Canvas	48.4%	42.9%	46.4%	60.0%	0.579
Business Model Canvas	51.5%	59.1%	44.4%	52.9%	0.593
Mission, Vision and Values	47.1%	40.0%	56.3%	38.9%	0.379
External Analysis- PEST or PESTEL	30.9%	12.5%	34.6%	46.2%	0.132
Income Statements	47.1%	47.6%	**60.0%**	23.5%	0.058*
Cash flow statements	39.1%	42.1%	46.4%	23.5%	0.302
Balance Sheet	30.9%	35.0%	38.7%	11.8%	0.142
"Finicia" Excel File	32.0%	47.4%	20.0%	27.3%	0.180
Financial and viability indicators	34.4%	42.9%	22.2%	43.8%	0.222
SWOT analysis	62.0%	57.1%	67.7%	57.9%	0.681
Porter's Five Forces	42.6%	36.8%	46.7%	42.1%	0.796
Marketing Mix	52.1%	52.4%	53.1%	50.0%	0.978

Note: values indicate the % of respondent that perceives the items as useful or very useful (8 and more in a scale of 10);
*** (**)[*] statistically significant at 1%(5%)[10%].

The perceived usefulness of tools such as *Business Model Canvas, Income Statements and SWOT Analysis* is significantly different depending on the nationality of the respondents (see Table 18). The Portuguese respondents tend to value more the *SWOT Analysis*, while the *Income Statements* and *Business Model Canvas* are preferred by the non-Portuguese.

Table 18: Business plan tools ' perceived usefulness: differences in means by nationality

	All	Non-Portuguese	Portuguese	Kruskal Wallis test (p-value)
Value Proposition Canvas	47.2%	60.0%	45.2%	0.386
Business Model Canvas	51.4%	**81.8%**	46.0%	0.030**
Mission, Vision and Values	45.5%	60.0%	43.3%	0.325
External Analysis- PEST or PESTEL	27.4%	9.1%	31.4%	0.136
Income Statements	44.7%	**70.0%**	40.9%	0.087*
Cash flow statements	37.5%	50.0%	35.5%	0.382
Balance Sheet	31.6%	40.0%	30.3%	0.541
"Finicia" Excel File	30.4%	33.3%	29.8%	0.834
Financial and viability indicators	34.7%	40.0%	33.9%	0.708
SWOT analysis	59.5%	27.3%	**64.7%**	0.020**
Porter's Five Forces	40.0%	36.4%	40.6%	0.791
Marketing Mix	51.9%	45.5%	52.9%	0.647

Note: values indicate the % of respondent that perceives the items as useful or very useful (8 and more in a scale of 10);
*** (**)[*] statistically significant at 1%(5%)[10%].

The usefulness of *Business Model Canvas* is also significantly higher for the respondents with a non-business-non-engineering academic background – 80% against 33.3% of the business background (see Table 19).

Table 19: Business plan tools ' perceived usefulness: differences in means by academic background

	All	Business	Engineering	Others	Kruskal Wallis test (p-value)
Value Proposition Canvas	50.0%	44.4%	51.5%	53.3%	0.855
Business Model Canvas	52.9%	33.3%	51.4%	**80.0%**	0.029**
Mission, Vision and Values	47.9%	44.4%	43.2%	62.5%	0.417
External Analysis- PEST or PESTEL	30.4%	31.3%	29.6%	30.8%	0.993
Income Statements	47.1%	42.1%	55.9%	35.3%	0.339
Cash flow statements	39.4%	38.9%	40.6%	37.5%	0.977
Balance Sheet	31.4%	33.3%	28.6%	35.3%	0.871
"Finicia" Excel File	32.7%	42.9%	26.1%	33.3%	0.578
Financial and viability indicators	34.8%	42.1%	35.5%	25.0%	0.573
SWOT analysis	61.6%	55.6%	60.5%	70.6%	0.649
Porter's Five Forces	42.0%	41.2%	35.1%	60.0%	0.262
Marketing Mix	53.4%	57.9%	45.9%	64.7%	0.401

Note: values indicate the % of respondent that perceives the items as useful or very useful (8 and more in a scale of 10);

*** (**)[*] statistically significant at 1%(5%)[10%].

It does not exist any significant differences in means by enrolment status (see Table A2, in Appendix) or professional experience (see Table A3, in Appendix).

The Business Plan Dimensions: Were they taught?

When analysing whether the business plan dimensions were taught or not, we obtained 78 answers for all the dimensions, which allows us to compare between the several differences in means. Overall, all the dimensions had positive results, being the *Team* dimension the one that is more controversial on whether it was taught or not and *Marketing* and *Company description* the ones that were least controversial (see Table 20).

Table 20: Business Plan dimensions - Were they taught? (global averages)

	Yes	No	I do not remember
Company and Product/Service Description	91%	1%	8%
Strategic Analysis	72%	10%	18%
Industry and Market Context – External Analysis	88%	6%	5%
Marketing and Sales Plan	92%	5%	4%
Team – Personnel and Management	58%	21%	22%
Financial Analysis	86%	8%	6%
Risk Analysis	62%	13%	26%

Notes: The values in the table represent the percentage of the respondents who answered "It was taught".
*** (**)[*] statistically significant at 1%(5%)[10%].

When we analysed the results by analysing the difference in means by variable, we did not find any statistically significant different results among edition (Table A5, in Appendix), entrepreneurial status (Table A6, in Appendix), enrolment status (Table A7, in Appendix), nationality (Table A8, in Appendix), and professional experience (Table A9, in Appendix).

We did find significant differences among different age groups (see Table 21) for the *Industry and Market Context* dimension, which is said to have been taught only by 50% of the 25 to 31 years old group and by 84.4% of the 32 to 40 years old group and by 84.2% of the alumni that are older than 40 years-old.

Table 21: Business Plan dimensions taught: differences in means by age

	All	25-31 years old	32-40 years old	more than 40 years old	Kruskal Wallis test (p-value)
Company and Product/Service Description	91.8%	95.5%	90.6%	89.5%	0.750
Strategic Analysis	89.0%	95.5%	87.5%	84.2%	0.487
Industry and Market Context – External Analysis	74.0%	50.0%	**84.4%**	84.2%	0.010***
Marketing and Sales Plan	90.4%	95.5%	90.6%	84.2%	0.480
Team – Personnel and Management	58.9%	50.0%	62.5%	63.2%	0.601
Financial Analysis	86.3%	90.9%	81.3%	89.5%	0.541
Risk Analysis	63.0%	63.6%	62.5%	63.2%	0.996

Notes: The values in the table represent the percentage of the respondents who answered "It was taught".
*** (**)[*] statistically significant at 1%(5%)[10%].

We also found significant differences between the means of the respondent with different academic backgrounds (Table 22) also for the *Industry and Market Context* dimension, which is perceived as being taught by only 52.9% of the respondent that do have neither a Business nor an Engineering background, whereas respondents from these fields answered positively by 80.0% and 78.9%, respectively.

Table 22: Business Plan dimensions taught: differences in means by academic background

	All	Business	Engineering	Others	Kruskal Wallis test (p-value)
Company and Product/Service Description	92.0%	100.0%	94.7%	76.5%	0.022**
Strategic Analysis	89.3%	90.0%	94.7%	76.5%	0.131
Industry and Market Context – External Analysis	73.3%	80.0%	78.9%	52.9%	0.099*
Marketing and Sales Plan	90.7%	90.0%	94.7%	82.4%	0.347
Team – Personnel and Management	58.7%	50.0%	68.4%	47.1%	0.222
Financial Analysis	86.7%	80.0%	94.7%	76.5%	0.112
Risk Analysis	62.7%	55.0%	73.7%	47.1%	0.123

Note: values indicate the % of respondent who asserts the selected dimension was taught;
*** (**)[*] statistically significant at 1%(5%)[10%]

The respondent with Business background also answered significantly different from the ones that have a non-Business and non-engineering graduation regarding the *Company and Product/Service Description* dimension: 100% of the Business respondent said that it was taught, 94.7% of the Engineering said yes and only 76.5% of those coming from other backgrounds said it was taught.

The Business Plan Dimensions: Perceived usefulness

When we take a first look at the results of the perceived usefulness of the several BP dimensions, we see that none of the dimensions was considered useful (with a rating from 8 to 10) by more than 50% of the respondents. We can also see in Table 23 that the dimension that is considered most useful is the *Company and Product/Service Description* (42%), followed by *Marketing and Sales Plan* (40%). Reminding the BP tools, the *Marketing Mix* had already been mentioned as the second most useful tool, which is consistent with these results. Both *Team – Personnel and Management* and *Risk Analysis* are seen as the least useful ones.

Table 23: Business Plan dimensions – perceived usefulness

	Entrepreneurs	MIETE Editions	Age groups	MIETE Status	Nationality	Academic Background	Years of Experience	Average
Company and Product/Service Description	42.7%	42.3%	41.1%	42.3%	42.3%	42.7%	42.7%	**42.3%**
Strategic Analysis	38.7%	37.2%	37.0%	37.2%	37.2%	38.7%	38.7%	**37.8%**
Industry and Market Context – External Analysis	26.7%	25.6%	27.4%	25.6%	25.6%	26.7%	26.7%	**26.3%**
Marketing and Sales Plan	40.0%	39.7%	39.7%	39.7%	39.7%	40.0%	40.0%	**39.9%**
Team – Personnel and Management	22.7%	21.8%	21.9%	21.8%	21.8%	22.7%	22.7%	**22.2%**
Financial Analysis	30.7%	30.8%	30.1%	30.8%	30.8%	30.7%	30.7%	**30.6%**
Risk Analysis	24.0%	23.1%	23.3%	23.1%	23.1%	24.0%	24.0%	**23.5%**

Note: values indicate the % of respondent that perceives the items as useful or very useful (8 and more in a scale of 10);

The variable that shows more significant differences in the usefulness perception is the creation of companies after MIETE, that is, the entrepreneurial status of the respondents, as can be seen in Table 24.

Table 24: Business Plan dimensions perceived usefulness: differences in means by entrepreneurial status

	All	Did not create firms after MIETE	Created firms after MIETE	Kruskal Wallis test (p-value)
Company and Product/Service Description	42.7%	33.3%	**62.5%**	0.018**
Strategic Analysis	38.7%	39.2%	37.5%	0.888
Industry and Market Context – External Analysis	26.7%	21.6%	37.5%	0.148
Marketing and Sales Plan	40.0%	31.4%	**58.3%**	0.027**
Team – Personnel and Management	22.7%	23.5%	20.8%	0.796
Financial Analysis	30.7%	23.5%	**45.8%**	0.052*
Risk Analysis	24.0%	17.6%	**37.5%**	0.062*

Note: values indicate the % of respondent that perceives the items as useful or very useful (8 and more in a scale of 10);

*** (**)[*] statistically significant at 1%(5%)[10%]

The respondents who are entrepreneurs have found that *Company and Product/Service Description* is more useful than for the non-entrepreneurs, with correspondent means of 62.5% against 33.3%. The same happens for the *Marketing* dimension, as well as for the *Financial Analysis* and *Risk Analysis*, which are all more important for entrepreneurs than for non-entrepreneurs. These four dimensions are, coincidentally, the more important ones for entrepreneurs.

We can find another significant difference in means by MIETE editions (see Table 25). Slightly more than half of the respondents (52.4%) of the 2013-2015 editions find that *Financial Analysis* is useful, against only 18.4% of the respondents of the 2008 to 2012/2013 editions and 31.6% of those from editions before 2008. In the editions between 2008 and 2012/2013 the BP courses were lectured by a professor that has had a relevant professional experience in Mergers and Acquisitions using the BP as a significant part of his work but who had never created a company or entered a new venture.

Table 25: Business Plan dimensions perceived usefulness: differences in means by edition

	All	Before 2008/09	Between 2008/09-2012/13	2013/14 and 2014/15	Kruskal-Wallis test (p-value)
Company and Product/Service Description	42.3%	57.9%	39.5%	33.3%	0.263
Strategic Analysis	37.2%	47.4%	28.9%	42.9%	0.332
Industry and Market Context – External Analysis	25.6%	42.1%	23.7%	14.3%	0.126
Marketing and Sales Plan	39.7%	42.1%	39.5%	38.1%	0.966
Team – Personnel and Management	21.8%	26.3%	18.4%	23.8%	0.769
Financial Analysis	30.8%	31.6%	18.4%	**52.4%**	0.027**
Risk Analysis	23.1%	31.6%	15.8%	28.6%	0.327

Note: values indicate the % of respondent that perceives the items as useful or very useful (8 and more in a scale of 10);

*** (**)[*] statistically significant at 1%(5%)[10%]

Strategic Analysis is more useful for respondents who are 32 to 40 years old than for those with 25 to 31 years old and the older than 40 years old, with a level of significance of under 1% (see Table 26).

No statistically significant differences in means were found regarding the other relevant variables, namely the enrolment status (see Table A10, in Appendix), nationality (see Table A11, in Appendix), academic background (see Table A12, in Appendix), and professional experience (see Table A13, in Appendix).

Table 26: Business Plan dimensions perceived usefulness: differences in means by age

	All	25-31 years old	32-40 years old	more than 40 years old	Kruskal Wallis test (pvalue)
Company and Product/Service Description	41.1%	27.3%	53.1%	36.8%	0.154
Strategic Analysis	37.0%	18.2%	**59.4%**	21.1%	0.002***
Industry and Market Context – External Analysis	27.4%	13.6%	34.4%	31.6%	0.223
Marketing and Sales Plan	39.7%	40.9%	46.9%	26.3%	0.351
Team – Personnel and Management	21.9%	9.1%	28.1%	26.3%	0.222
Financial Analysis	30.1%	31.8%	31.3%	26.3%	0.915
Risk Analysis	23.3%	22.7%	28.1%	15.8%	0.604

Note: values indicate the % of respondent that perceives the items as useful or very useful (8 and more in a scale of 10);

*** (**)[*] statistically significant at 1%(5%)[10%].

4.2.3. Econometric multivariate model: estimation results

Business Plan Tools

As mentioned before, we opted to use a logistic regression for the estimation of the econometric multivariate model. In order to insure the quality of the results, we started by analysing the correlations among the variables (see Table A14, in Appendix). The most significant and with higher Pearson correlation coefficient (above 0.60) relates the number of years of experience and age. This relationship is quite predictable, as in general the older people tend to have more years of professional experience. Notwithstanding this high correlation, estimations with and without these variable jointly included did not produce distinct results. Therefore, we opted for estimating the full models.

Although the estimated models for the determinants of BP tools' usefulness evidence reasonable quality of adjustment (the percentage of observation of the dependent variable estimated correctly is high and the test of Hosmer and Lemeshow accept in general the null hypothesis that the model represents the reality well), for the majority of tools, none of the variables included in the specifications seem to influence the perceived usefulness of respondents (see Table 27).

Table 27: Usefulness of Business Plan Tools: Logistic estimations (Dependent variables are dummies which assume value 1 when the respondent attributed 8-10 values and 0 otherwise)

		Value Proposition Canvas	Business Model Canvas	Mission, Vision and Values	PEST or PESTAL	Income Statements	Cash flow statements	Balance Sheet	"Finicia" Excel file	Financial and viability indicators	SWOT Analysis	Porter's Five Forces	Marketing Mix
Background	**Entrepreneurs** (dummy variable, 1 if he/she created a firm after MIETE; 0 otherwise)	-0.075	-0.279	0.660	-0.054	0.581	1.483**	1.040*	-0.112	0.655	0.459	0.389	0.320
	Professional experience (ln)	0.088	0.490	-0.055	0.826	-0.454	-0.391	0.008	-0.304	-0.435	0.397	-0.057	-0.531
	Engineering (dummy variable, 1 if the course before MIETE was engineering related; 0 otherwise)	-0.245	-0.116	-0.540	0.055	0.723	0.157	-0.170	-0.427	-0.004	-0.190	-0.769	-0.790
MIETE	**Edition** (dummy variable, 1 if enrolled in 2008/09 or earlier editions; 0 otherwise)	1.859**	1.181	0.232	0.638	-0.119	-1.255	-0.772	-0.044	0.108	0.634	-0.086	-0.041
	Suspended (dummy variable, 1 if suspended the course; 0 otherwise)	-0.277	-0.065	0.281	0.065	0.337	-0.415	0.201	-1.464	-0.680	0.894	1.298*	0.838
	Concluded (dummy variable, 1 if concluded the course; 0 otherwise)	0.522	0.591	0.557	-0.405	0.549	0.619	0.457	0.001	-0.531	-0.241	-0.093	0.009
Demographics	**Age** (ln)	-0.138	-2.240	0.721	-0.612	0.810	2.480	-0.656	-1.565	1.501	-3.103	1.958	1.664
	Nationality (dummy variable, 1 if Portuguese; 0 otherwise)	-0.887	-1.729**	-0.615	1.086	-0.972	-0.305	0.048	0.600	-0.388	2.038**	0.000	0.499
	N	66	68	71	56	70	66	70	52	66	73	69	73
	Usefulness 8-10	33	36	34	17	33	26	22	17	23	45	29	39
	Usefulness below 8	33	32	37	39	37	40	48	35	43	28	40	34
Goodness of fit	**Hosmer and Lemeshow test (p-value)**	0.395	0.492	0.285	0.783	0.431	0.553	0.425	0.642	0.234	0.598	0.388	0.011
	% correct	65.2	63.2	62	66.1	61.4	68.2	65.7	73.1	71.2	69.9	65.2	68.5

Note: light grey values indicate the statistical significant coefficients. *** (**)[*] statistically significant at 1%(5%)[10%].

The estimation results are in line with the exploratory analysis regarding the differences in means as for most of the BP tools no determinants is statistically significant. The exceptions occur for the BP tools *Value Proposition Canvas, Business Model Canvas, Cash flow statements, Balance Sheet, SWOT Analysis*, and *Porter's Five Forces*.

In the case of the BP tool *Value Proposition Canvas*, on average, all the other factor remaining constant, respondents enrolled in 2008/09 or earlier editions are more likely to find this tool useful in their professional lives. Specifically, a respondent enrolled in 2008/09 or earlier editions present an odd of perceived usefulness 6.4 ($e^{1.859}$) higher than those enrolled in other editions.

Regarding the tool *Business Model Canvas,* Portuguese respondents compared to their foreign counterparts reveal a lower likelihood for finding this tool useful. In concrete, foreign respondents present an odds of perceived usefulness approximately 6 times higher than that of the Portuguese. In contrast, for the BP tool *SWOT Analysis,* the odds of perceived usefulness is almost 8 times higher for the Portuguese respondents.

In the case of *Cash Flow Statements* and *Balance Sheet* the only relevant determinant is the entrepreneurial status of the respondent. Those who have already created a business, compared with non-entrepreneurs reveal a higher perceived usefulness regarding these BP tools, with an odds of perceived usefulness 4.4 (2.8) times higher in the case of *Cash Flow Statements* (*Balance Sheet*).

Finally, the odds of perceived usefulness regarding the *Porter's Five Forces* is 3.7 times higher for respondents who have suspended their enrolment compared to those who have concluded or are still enrolled in MIETE.

Business Plan Dimensions

Once more, although the estimated models for the determinants of the dimensions of BP usefulness evidence reasonable quality of adjustment (the percentage of observation of the dependent variable estimated correctly is relatively high and the test of Hosmer and Lemeshow accepts the null hypothesis that the models represent the reality well), for the majority of BP dimensions, none of the variables included in the specifications seem to influence the perceived usefulness of respondents (see Table 28).

Table 28: Usefulness of Business Plan Dimensions: Logistic estimations (Dependent variables are dummies which assume value 1 when the respondent attributed 8-10 values and 0 otherwise)

		Company and Product/Service Description		Strategic Analysis		Industry and Market Context – External Analysis		Marketing and Sales Plan		Team – Personnel and Management		Financial Analysis		Risk Analysis	
		Beta	*p-value*	**Beta**	*p-value*	**Beta**	*p-value*	**Beta**	*p-value*	**Beta**	*p-value*	**Beta**	*p-value*	**Beta**	*p-value*
Background	**Entrepreneurs** (dummy variable, 1 if he/she created a firm after MIETE; 0 otherwise)	1.332**	*0.019*	-0.129	*0.810*	0.963	*0.117*	1.148**	*0.034*	-0.334	*0.602*	0.929*	*0.089*	0.890	*0.145*
	Professional experience (ln)	-0.655	*0.285*	-0.504	*0.378*	-0.177	*0.801*	-0.295	*0.614*	-0.586	*0.395*	-0.395	*0.525*	-0.291	*0.656*
	Engineering (dummy variable, 1 if the course before MIETE was engineering related; 0 otherwise)	0.166	*0.750*	-0.059	*0.906*	-0.279	*0.645*	-0.152	*0.769*	-0.398	*0.502*	0.235	*0.664*	-0.414	*0.512*
MIETE	**Edition** (dummy variable, 1 if enrolled in 2008/09 or earlier editions; 0 otherwise)	0.363	*0.644*	0.384	*0.609*	0.255	*0.766*	0.027	*0.973*	-0.038	*0.966*	-0.187	*0.824*	1.223	*0.190*
	Suspended (dummy variable, 1 if suspended the course; 0 otherwise)	-0.412	*0.567*	0.244	*0.725*	-0.799	*0.335*	0.057	*0.935*	0.889	*0.251*	0.278	*0.699*	1.493**	*0.050*
	Concluded (dummy variable, 1 if concluded the course; 0 otherwise)	0.370	*0.612*	0.358	*0.606*	-1.627	*0.155*	-0.308	*0.673*	1.018	*0.214*	0.459	*0.534*	0.331	*0.707*
Demographics	**Age** (ln)	2.550	*0.398*	0.776	*0.783*	3.485	*0.337*	-0.386	*0.895*	4.147	*0.223*	2.165	*0.482*	0.068	*0.984*
	Nationality (dummy variable, 1 if Portuguese; 0 otherwise)	0.826	*0.319*	0.761	*0.339*	-0.997	*0.266*	1.012	*0.212*	0.093	*0.920*	-0.312	*0.688*	-0.883	*0.300*
	N	75		75		75		75		75		75		75	
	Usefulness 8-10	32		46		20		30		17		23		18	
	Usefulness below 8	43		29		55		45		58		52		57	
Goodness of fit	Hosmer and Lemeshow test (p-value)	0.889		0.307		0.662		0.226		0.979		0.811		0.800	
	% correct	68.0		62.7		72.0		60.0		77.3		69.3		76.0	

Note: light grey values indicate the statistical significant coefficients. *** (**)[*] statistically significant at 1%(5%)[10%].

The odds of perceived usefulness regarding the dimension *Risk Analysis* is 4.5 times higher for respondents who have suspended their enrolment compared to those who have concluded or are still enrolled in MIETE.

Those who already created a business, compared with non-entrepreneurs, reveal a higher perceived usefulness regarding the dimensions *Company and Product/Service Description, Marketing and Sales Plan,* and *Financial Analysis* evidencing an odds of perceived usefulness 3.8, 3.2, and 2.5 times higher, respectively.

5. Conclusions

5.1. Main results and contribution

The aim of the present dissertation was to assess whether business planning (tools and dimensions) was actually perceived as important for professional lives of individuals who have attended a formal programme (a master) devoted to entrepreneurship education.

The obtained results show us that, even though some of the business planning tools such as *SWOT analysis, Marketing Mix and Business Model Canvas* are seen as very useful by the alumni, the several dimensions that form part of the business plan are not perceived as very useful for most of the former students.

Our main results point out that there are clear differences in terms of the perception of the usefulness of the BP between the alumni that are entrepreneurs and the ones that are not, which is in line not only with the interviews conducted with two alumni but also with the interviews conducted to lecturers. It is also in line with the open question results. The entrepreneurs find the *Company and Product/Service Description* is more important, which includes the full comprehension of the business itself and the products that will be commercialized, as well as all inherent operations. The entrepreneurs also stand out from non-entrepreneurs regarding their perception on *Marketing and Sales* dimension and regarding the *Financial Analysis*. Entrepreneurs find these dimensions more useful than the non-entrepreneurs. These differences may be explained by the fact that Entrepreneurs actually apply the lessons obtained in MIETE in real business situations, while non-entrepreneurs might use it in existing companies as strategic plans or to set up new business units, but without the pressure of creating a whole new business.

5.2. Implications for scientific knowledge

Being one of the purposes of a formal Entrepreneurship Education degree to set the conditions for the creation of new ventures, understanding the perceived usefulness for professional lives of a great part of a degree in the perspective of its former students might influence the options of programme content in future editions of this master's degree (MIETE) or for other degrees that have similar outlines and objectives.

This work was developed due to the fact that there is little literature that addresses the most appropriate content to fit the purposes of entrepreneurship courses and it sheds a light on the usefulness perception (or lack thereof) of the business plan in the lives of students after learning it during a post-graduate degree in entrepreneurship, leaving the door open to other contents other than business planning. This work may have direct impact on the choices of curricula of new and existing formal post-graduation progammes, as it may be interesting to give more relevance to other business creation tools and strategies rather than the traditional dimensions of business plans. If the objectives of the courses are indeed the creation of new ventures, than it would be advantageous to re-think contents according to the usefulness perception of the entrepreneurs, as opposed to non-entrepreneurs' opinions or experience.

5.3. Limitations and venues for future research

Throughout the research made in the present study, and based on what has been published in the literature, we came to the conclusion that Entrepreneurship Education is a broad category composed of many very different programmes. In this study we focused merely on the business planning aspect of a specific entrepreneurship master degree, but it would be interesting to understand if other entrepreneurship curricula are useful or not for the future lives of the alumni and what differences arise between the alumni that set up companies and the ones that end up working for existing companies. Before starting the analysis, we would suggest that the researchers, and the directors of the programmes, made a deep strategic plan regarding what are the main goals and objectives of the course in order to understand the adequacy of the results.

This study would also have been more comprehensive if it had covered other business plan based courses/degrees in other cultural settings or with a different set of students with different backgrounds.

References

AAAES (2014). "Relatório final da CAE ACEF/1213/21347", Ministério da Ciência, Tecnologia e Ensino Superior, A3ES: Agência de Acreditação e Avaliação do Ensino Superior.

Botha, M.; Robertson, C.L. (2013). "Potential entrepreneurs' assessment of opportunities through the rendering of a business plan", *South African Journal of Economic and Management Sciences,* 17(3): 249-265.

Brinckmann, J.;Grichnik, D.; Kapsa, D. (2010), "Should entrepreneurs plan or just storm the Castle? A meta-analysis of contextual factors impacting the business planning-performance relationship in small firms", *Journal of Business Venturing* 25: 24-40.

Bygrave, W.; Zacharakis, A. (2011), *Entrepreneurship* (2nd Ed.), UK: John Wiley & Sons, Inc.

Castrogiovanni, G.J. (1996), "Pre-startup planning and the survival of new small Businesses: Theoretical Linkages", *Journal of Management,* 22 (6): 801-822.

Chwolka, A.; Raith, M.G. (2012), "The value of business planning before start-up – a decision – theoretical perspective", *Journal of Business Venturing*, 27: 385-399.

Delmar, F.; Shane, S. (2003), "Does Business Planning facilitate the development of new ventures?" *Strategic Management Journal,* 24: 1165-1185.

Duarte, C.; Esperança, J. (2012), *Empreendedorismo e Planeamento Financeiro* (2nd Ed.) Lisboa, Portugal: Edições Sílabo.

Edelman, L.; Manolova, T.; Brush, C. (2008), "Entrepreneurship Education: Correspondence between practices of nascent entrepreneurs and textbook prescriptions for success", *Academy of Management Learning & Education*, 7(1): 56-70.

EC (2008), *Best Procedure Project: Entrepreneurship in Higher Education, Especially in Non-Business Studies*, Final Report of the Expert Group, European Commission, retrieved from http://ec.europa.eu/DocsRoom/documents/ 8969/ attachments/1/ translations/en/renditions/native.

Fayolle, A. (2013), "Personal views on the future of entrepreneurship education" *Entrepreneurship & Regional Development,* 25(7-8):692-701.

Ferreira, J.J.P. (2007), "2nd Cycle Master Programme in Innovation and Technological Entrepreneurship", Mimeo, Universidade do Porto.

Honig, B. (2004). "Entrepreneurship Education: toward a model of contingency-based Business Planning", *Academy of Management Learning & Education,* 3(3): 258-273.

Honig, B; Karlsson, T. (2002). "Institutional forces and the written business plan", *Journal of Management,* 30 (1): 29-48.

Hynes, B. (1996). "Entrepreneurship education and training: introducing entrepreneurship into non-business disciplines", *Journal of European Industrial Training,* 20 (8):10-17.

Instituto Nacional de Estatística (2015), *Monthly Employment and Unemployment Estimates – January 2015*, DESTAQUE Press Release, Retrieved from https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_destaques&DESTAQUESdest_boui=223546978&DESTAQUESmodo=2.

Jones, C.; Penaluna, A. (2013), "Moving beyond the business plan in enterprise education", *Education + Training*, 55(8/9): 804-814.

Kourilsky, M.; Walstad, W. (2002), "The early environment and schooling experiences of high-technology entrepreneurs: insights for education*", International Journal of Entrepreneurship Education,* 1(1): 1-20.

Lange, J.; Mollov, A.; Pearlmutter, M.; Singh, S.; Bygrave, W.D. (2007), "Pre-start-up formal business plans and post-start-up performance: a study of 116 new ventures", *Venture Capital*, 9 (4): 237-256.

McMullan, W.E.; Long, W.A. (1987), "Entrepreneurship education in the nineties", *Journal of Business Venturing,* 2(3): 261-275.

Morris, M.; Schindehutte, M.; Allen, J. (2003), "The entrepreneur's business model: toward a unified perspective", *Journal of Business Research*, 58: 726-735.

Mwasalwiba, E.S. (2010), "Entrepreneurship education. A review of its objectives, teaching methods, and impact indicators", *Education + Training,* 52(1): 20-47.

Nicholls-Nixon, C.L.; Cooper, A.C.; Woo, C.U. (2000), "Strategic Experimentation: understanding change and Performance in New Ventures", *Journal of Business Venturing,* 15: 493-521.

Pardede, E. (2015), "The use of modern pedagogical techniques when introducing information technology students to entrepreneurship", *Teaching in Higher Education,* 20 (6): 636-651.

Pardo, C. (2013), "Is business creation the mean or the end of entrepreneurship education? A multiple case study exploring teaching goals in Entrepreneurship Education", *Journal of Technology Management & Innovation,* 8(1):1-10.

Piperopoulos, P.; Dimov, D. (2015), "Burst Bubbles or Build Steam? Entrepreneurship Education, Entrepreneurial Self-Efficacy, and Entrepreneurial Intentions", *Journal of Small Business Management,* 53(4): 970-985.

Rideout, E.C.; Gray, D.O. (2013), "Does education really work? A review and methodological critique of the empirical literature on the effects of university-based entrepreneurship education", *Journal of Small Business Management,* 51(3): 329-351.

Russel, R.; Atchison, M.; Brooks, R. (2008), "Business Plan competitions in tertiary institutions: encouraging entrepreneurship education", *Journal of Higher Education Policy and Management,* 30 (2): 123-138.

Sahlman, W.A. (1997), "How to write a great business plan", *Harvard Business Review,* July - August 1997: 97-108.

Santos, S.; Pimpão, A.; Costa, S.; Caetano, A. (2013), "A formação em Empreendedorismo: Análise Comparativa no Ensino Superior Português", *Handbook de Educação em Empreendedorismo no Contexto Português,* Universidade Católica Editora, p. 217-240.

Saunders, M.; Lewis, P.; Thornhill, A. (2009), *Research Methods for Business Students,* Essex, England: Pearson Education, 5th Edition.

Shane, S.; Delmar, F. (2003), "Planning for the market: business planning before marketing and the continuation of organizing efforts", *Journal of Business Venturing,* 19: 767-785.

Shirish, T. (2014); *Research Methodologies in Education,* USA: Lulu Publications.

Singer, S.; Amorós, J.E.; Moska, D. (2014), *Global Entrepreneurship Monitor 2014 Global Report*, Global Entrepreneurship Research Association, Retrieved from http://www.gemconsortium.org/report.

Sirelkhatim, F.; Gangi, Y. (2015), "Entrepreneurship education: A systematic literature review of curricula contents and teaching methods", *Cogent Business & Management*, 2:1-11.

Universidade do Porto – Sigarra, *Mestrado em Inovação e Empreendedorismo Tecnológico*, Retrieved February 27, 2016 from https://sigarra.up.pt/feup/pt/cur_geral.cur_planos_estudos_list?pv_curso_id=719&pv_ano_lectivo=2013&pv_tipo_cur_sigla=&pv_origem=CUR.

Van der Sluis, J.; van Praag, M.; Vijverberg, W. (2008), "Education and entrepreneurship selection and performance: A Review of the empirical literature", *Journal of Economic Surveys*, 22(5): 795-841.

Wursten, H.; Lanzer, F. (2012), *The EU: the third great European cultural contribution to the world*, Itim International 2012, Retrieved from http://www.clubofamsterdam.com/ contentarticles/86%20Europe/ itim%20eu%20report.pdf , accessed in 12/12/2015.

Appendix A: Survey on Business Planning and Entrepreneurship Education

 Survey: Business Planning and Entrepreneurship Education

Dear colleague,

This survey is an essential component of my dissertation in the Master of Innovation and Technological Entrepreneurship (MIETE). Its purpose is to study the perceptions of MIETE Alumni on the usefulness (in professional terms) of the Business Planning tools (eventually) taught at MIETE.

I thank you in advance for your cooperation, which is fundamental for the success of my dissertation. Should you have any queries, please contact me by email isabel.gaspar.pereira@gmail.com or mobile: + 351 918 376 768.

Isabel Gaspar Pereira

There are 14 questions in this survey

Section 1. Business Planning tools

The set of questions in this section aims at inquiring your perception regarding the teaching/usage and usefulness (for your professional life) of given Business Planning Tools.

[]

Question 01.

Of the following techniques of business planning, please identify which ones were taught at MIETE.

*

Please choose the appropriate response for each item:

	Taught at MIETE	Not taught at MIETE	I don't remember.
Value Proposition Canvas	○	○	○
Business Model Canvas	○	○	○
Mission, Vision and Values	○	○	○
PEST or PESTLE Analysis (Politics, Economical, Social and Technological + Legal and Environmental)	○	○	○
Income statements	○	○	○
Cash Flow statements	○	○	○
Balance Sheet	○	○	○
"Finicia" Excel File	○	○	○
Financial and Project Indicators	○	○	○
SWOT Analysis	○	○	○
Porter's Five Forces	○	○	○
Marketing Mix	○	○	○

[]

Question 01.01

Of the following techniques of business planning, please state their usefulness throughout your professional life after leaving MIETE.

Answers in a scale from 0 (not useful) to 10 (very useful).

*

Please choose the appropriate response for each item:

	1 (not useful)	2	3	4	5	6	7	8	9	9 (very useful)	Not taught at MIETE/ I don't remember
Value Proposition Canvas	○	○	○	○	○	○	○	○	○	○	○
Business Model Canvas	○	○	○	○	○	○	○	○	○	○	○
Mission, Vision and Values	○	○	○	○	○	○	○	○	○	○	○
PEST or PESTLE Analysis (Politics, Economical, Social and Technological + Legal and Environmental)	○	○	○	○	○	○	○	○	○	○	○
Income statements	○	○	○	○	○	○	○	○	○	○	○
Cash Flow statements	○	○	○	○	○	○	○	○	○	○	○
Balance Sheet	○	○	○	○	○	○	○	○	○	○	○
"Finicia" Excel File	○	○	○	○	○	○	○	○	○	○	○
Financial and Project Indicators	○	○	○	○	○	○	○	○	○	○	○
SWOT Analysis	○	○	○	○	○	○	○	○	○	○	○
Porter's Five Forces	○	○	○	○	○	○	○	○	○	○	○
Marketing Mix	○	○	○	○	○	○	○	○	○	○	○

Section 2. Business Plan dimensions

In this section I kindly ask you to remember the several dimensions of the Business Plan that were, or not, taught at MIETE.

[]

Question 02.01

Considering the Business Plan's dimension Company and Product/Service Description, please identify whether it was taught at MIETE or not and its relevance in your professional life, after MIETE.

Answers in scale, from 0 (not useful) to 10 (very useful).

If you chose "No" or "I don't remember", please chose "1(Not useful)" on the second scale.

*

Please choose the appropriate response for each item:

	Taught at MIETE?			Usefulness for your professional life									
	YES	NO	I don't remember.	1 (not useful)	2	3	4	5	6	7	8	9	10 (very useful)
Company and Product/Service Description	○	○	○	○	○	○	○	○	○	○	○	○	○

This Business Plan dimension includes, for example:

Description of the business itself, product/service description, product/service advantages, technology description, production/operations plan, equipment needs, suppliers and partners, development plan and budget, location and physical evidence)

[]

Question 02.02

Considering the Business Plan dimension Strategic Analysis, please identify if it was taught at MIETE and its relevance in your professional life, after MIETE.

Answers in scale, from 0 (Not important/not useful) to 10 (very useful/very important).

If you chose "No" or "I don't remember", please chose "1-Not useful" on the second scale.

*

Please choose the appropriate response for each item:

	Taught at MIETE?			Usefulness for your professional life									
	YES	NO	I don't remember.	1 (not useful)	2	3	4	5	6	7	8	9	10 (very useful)
Strategic Analysis	○	○	○	○	○	○	○	○	○	○	○	○	○

The Strategic Analysis includes, for example, market strategies, competition analysis, barriers to entry and to exit, positioning, strenghts and weaknesses, threats and opportunities.

[]

Question 02.03

Considering the Business Plan dimension Industry and Market Context - External Anaysis, please indicate if it was taught at MIETE and its relevance in your professional life after MIETE.

Answers in scale, from 0 (Not important/not useful) to 10 (very useful/very important).

If you chose "No" or "I don't remember", please chose "1-Not useful" on the second scale.

*

Please choose the appropriate response for each item:

	Taught at MIETE?			Usefulness for your professional life									
	YES	NO	I don't remember.	1 (not useful)	2	3	4	5	6	7	8	9	10 (very useful)
Industry and Market Context – External Analysis	○	○	○	○	○	○	○	○	○	○	○	○	○

The Industry and Market Context – External Analysis, includes, for example, a description of the market and industry, external context such as political, economical and legal context, industry growth rate, issues of the industry.

[]

Question 02.04

Considering the Business Plan dimension Marketing and Sales Plan, please indicate if it was taught at MIETE and its relevance in your professional life after MIETE.

Answers in scale, from 0 (Not important/not useful) to 10 (very useful/very important).

If you chose "No" or "I don't remember", please chose "1-Not useful" on the second scale.

*

Please choose the appropriate response for each item:

	Taught at MIETE?			Usefulness for your professional life									
	YES	NO	I don't remember.	1 (not useful)	2	3	4	5	6	7	8	9	10 (very useful)
Marketing and Sales Plan	○	○	○	○	○	○	○	○	○	○	○	○	○

The Marketing and Sales Plan includes, for example, the sales potential, the promotion plan, pricing, marketing mix, clients archetypes and typification,customer development strategy, distribution and channels.

[]

Question 02.05

Considering the Business Plan dimension "Team - Personnel and Management", please indicate if it was taught at MIETE and its relevance in your professional life after MIETE.

Answers in scale, from 0 (Not important/not useful) to 10 (very useful/very important).

If you chose "No" or "I don't remember", please chose "1-Not useful" on the second scale.

*

Please choose the appropriate response for each item:

	Taught at MIETE?			Usefulness for your professional life									
	YES	NO	I don't remember.	1 (not useful)	2	3	4	5	6	7	8	9	10 (very useful)
Team – Personnel and Management	○	○	○	○	○	○	○	○	○	○	○	○	○

The Team – Personnel and Management includes, for example, the promoters' background and motivations, the organizational structure, number of staff needed, skills and education, specific training needs.

[]

Question 02.06

Considering the Business Plan dimension Financial Analysis, please indicate if it was taught at MIETE and its relevance in your professional life after MIETE.

Answers in scale, from 0 (Not important/not useful) to 10 (very useful/very important).

If you chose "No" or "I don't remember", please chose "1-Not useful" on the second scale.

*

Please choose the appropriate response for each item:

	Taught at MIETE?			Usefulness for your professional life									
	YES	NO	I don't remember.	1 (not useful)	2	3	4	5	6	7	8	9	10 (very useful)
Financial Analysis	○	○	○	○	○	○	○	○	○	○	○	○	○

Finacial Analysis(includes, for example, preparing metrics plans or statements, such as financial, income, cash flow and balance sheet statements, capital requirements, overhead expenses, costs of goods sold.

[]

Question 02.07

Considering the Business Plan dimension Risk Analysis, please indicate if it was taught at MIETE and its relevance in your professional life after MIETE.

Answers in scale, from 0 (Not important/not useful) to 10 (very useful/very important).

If you chose "No" or "I don't remember", please chose "1-Not useful" on the second scale.

*

Please choose the appropriate response for each item:

	Taught at MIETE?			Usefulness for your professional life									
	YES	NO	I don't remember.	1 (not useful)	2	3	4	5	6	7	8	9	10 (very useful)
Risk Analysis	○	○	○	○	○	○	○	○	○	○	○	○	○

Risk Analysis includes a description of critical risk that may cause the business not to succeed.

Section 3. Business Planning at MIETE

[]

Question 03.

Considering your professional carreer after MIETE, would you add any content to the way Business Planning is taught at MIETE? If so, what would you suggest?

Please write your answer here:

Section 4. Characteristics, academic and professional background before and after MIETE

In this section I will make you a few personal questions and inquire you regarding your professional background, before and after MIETE.

[]

Question 04 .

Year of Birth

*

Please write your answer here:

[]

Question 05.

Please write your nationality

*

Please write your answer here:

[]

Question 06.

Did you finish MIETE?

*

Please choose the appropriate response for each item:

	No. I did not finish the curricular part and I did not submit the dissertation.	.No. I finished the curricular part, but I did not submit the dissertation.	Yes.
Finished MIETE	○	○	○

[]

Question 07.

Please fill in the table regarding your Academic and Professional Background.

In case you have not started a company, please write "none" on the last cells.

*

	Before MIETE	After MIETE
Highest Academic Degree obtained		
Academic Area of Studies (Engineering, Technology, Economics, etc)		
Professional Experience (in Years - in total)		
Number of companies set up, as an entrepreneur (in total)		
Field of business of the companies you have set up		

I thank you for your reply.

Isabel Gaspar Pereira

05-18-2016 – 00:00

Submit your survey.
Thank you for completing this survey.

Appendix B: Detailed descriptive statistics

Are the business planning tools useful?

Notes:

In all tables *** (**)[*] means statistically significant at 1%(5%)[10%]

The values in the tables correspond to the percentage of respondents who perceive the selected items as useful or very useful (8 and more in a scale of 10)

Table A 1: Business plan tools ' perceived usefulness

	Entrepreneurs [Created firms after MIETE]	Edition of MIETE	Age group	Status in MIETE	Nationality	Academic Background	Years of professional experience
Value Proposition Canvas	50.0%	47.2%	48.4%	47.2%	47.2%	50.0%	50.0%
Business Model Canvas	52.9%	51.4%	51.5%	51.4%	51.4%	52.9%	52.9%
Mission, Vision and Values	47.9%	45.5%	47.1%	45.5%	45.5%	47.9%	47.9%
External Analysis- PEST or PESTEL	30.4%	27.4%	30.9%	27.4%	27.4%	30.4%	30.4%
Income Statements	47.1%	44.7%	47.1%	44.7%	44.7%	47.1%	47.1%
Cash flow statements	39.4%	37.5%	39.1%	37.5%	37.5%	39.4%	39.4%
Balance Sheet	31.4%	31.6%	30.9%	31.6%	31.6%	31.4%	31.4%
"Finicia" Excel File	32.7%	30.4%	32.0%	30.4%	30.4%	32.7%	32.7%
Financial and viability indicators	34.8%	34.7%	34.4%	34.7%	34.7%	34.8%	34.8%
SWOT analysis	61.6%	59.5%	62.0%	59.5%	59.5%	61.6%	61.6%
Porter's Five Forces	42.0%	40.0%	42.6%	40.0%	40.0%	42.0%	42.0%
Marketing Mix	53.4%	51.9%	52.1%	51.9%	51.9%	53.4%	53.4%

Table A 2: Business plan tools ' perceived usefulness: differences in means by enrolment status

	All	Interrupted, lapsed	Attending MIETE	Concluded	Kruskal Wallis test (p-value)
Value Proposition Canvas	47.2%	37.5%	53.3%	48.8%	0.651
Business Model Canvas	51.4%	43.8%	66.7%	48.8%	0.394
Mission, Vision and Values	45.5%	50.0%	53.8%	41.7%	0.680
External Analysis- PEST or PESTEL	27.4%	26.7%	18.2%	30.6%	0.725
Income Statements	44.7%	50.0%	57.1%	39.1%	0.446
Cash flow statements	37.5%	40.0%	50.0%	32.6%	0.496
Balance Sheet	31.6%	43.8%	42.9%	23.9%	0.209
"Finicia" Excel File	30.4%	8.3%	40.0%	34.5%	0.167
Financial and viability indicators	34.7%	28.6%	26.7%	39.5%	0.581
SWOT analysis	59.5%	68.8%	53.3%	58.3%	0.663
Porter's Five Forces	40.0%	62.5%	30.8%	34.8%	0.116
Marketing Mix	51.9%	62.5%	46.7%	50.0%	0.624

Table A 3: Business plan tools ' perceived usefulness: differences in means by respondents' professional experience

	All	0-3 years	4-9 years	10 years or more	Kruskal Wallis test (p-value)
Value Proposition Canvas	50.0%	52.2%	47.8%	50.0%	0.958
Business Model Canvas	52.9%	56.5%	47.8%	54.5%	0.828
Mission, Vision and Values	47.9%	40.9%	57.7%	43.5%	0.452
External Analysis- PEST or PESTEL	30.4%	17.6%	28.6%	44.4%	0.227
Income Statements	47.1%	54.2%	45.8%	40.9%	0.663
Cash flow statements	39.4%	42.9%	39.1%	36.4%	0.910
Balance Sheet	31.4%	30.4%	36.0%	27.3%	0.809
"Finicia" Excel File	32.7%	47.1%	35.0%	13.3%	0.128
Financial and viability indicators	34.8%	40.9%	26.1%	38.1%	0.545
SWOT analysis	61.6%	62.5%	56.0%	66.7%	0.744
Porter's Five Forces	42.0%	31.8%	47.8%	45.8%	0.501
Marketing Mix	53.4%	58.3%	50.0%	52.2%	0.833

Were the business planning's dimensions taught?

Notes:

In all tables *** (**)[*] means statistically significant at 1%(5%)[10%]

The values in the tables correspond to the percentage of respondents who asserts that the selected dimension was taught.

Table A 4: Business Plan dimensions taught

	All (no.)	I do not remember (no.)	No (no.)	Yes (no.)	I do not remember (%)	No (%)	Yes (%)
Company and Product/Service Description	78	6	1	71	7.7%	1.3%	**91.0%**
Strategic Analysis	78	14	8	56	17.9%	10.3%	**71.8%**
Industry and Market Context – External Analysis	78	4	5	69	5.1%	6.4%	**88.5%**
Marketing and Sales Plan	78	3	4	71	3.9%	5.2%	**92.2%**
Team – Personnel and Management	78	17	16	45	21.8%	20.5%	**57.7%**
Financial Analysis	78	5	6	67	6.4%	7.7%	**85.9%**
Risk Analysis	78	20	10	48	26.0%	13.0%	**62.3%**

Table A 5: Business Plan dimensions taught: differences in means by edition

	All	Before 2008/09	Between 2008/09-2012/13	2013/14 and 2014/15	Kruskal-Wallis test (p-value)
Company and Product/Service Description	91.0%	89.5%	89.5%	95.2%	0.735
Strategic Analysis	88.5%	84.2%	86.8%	95.2%	0.506
Industry and Market Context – External Analysis	71.8%	84.2%	65.8%	71.4%	0.350
Marketing and Sales Plan	91.0%	84.2%	89.5%	100.0%	0.200
Team – Personnel and Management	57.7%	68.4%	55.3%	52.4%	0.545
Financial Analysis	85.9%	84.2%	81.6%	95.2%	0.347
Risk Analysis	61.5%	68.4%	57.9%	61.9%	0.746

Table A 6: Business Plan dimensions taught: differences in means by entrepreneurial status

	All	Did not create firms after MIETE	Created firms after MIETE	Kruskal Wallis test (p-value)
Company and Product/Service Description	92.0%	90.2%	95.8%	0.404
Strategic Analysis	89.3%	90.2%	87.5%	0.726
Industry and Market Context – External Analysis	73.3%	72.5%	75.0%	0.824
Marketing and Sales Plan	90.7%	94.1%	83.3%	0.137
Team – Personnel and Management	58.7%	62.7%	50.0%	0.299
Financial Analysis	86.7%	90.2%	79.2%	0.193
Risk Analysis	62.7%	64.7%	58.3%	0.597

Table A 7: Business Plan dimensions taught: differences in means by enrolment status

	All	Interrupted or lapsed	Attending	Concluded	Kruskal Wallis test (p-value)
Company and Product/Service Description	91.0%	92.9%	100.0%	87.8%	0.341
Strategic Analysis	88.5%	92.9%	93.3%	85.7%	0.618
Industry and Market Context – External Analysis	71.8%	71.4%	60.0%	75.5%	0.510
Marketing and Sales Plan	91.0%	85.7%	100.0%	89.8%	0.363
Team – Personnel and Management	57.7%	57.1%	46.7%	61.2%	0.611
Financial Analysis	85.9%	78.6%	100.0%	83.7%	0.198
Risk Analysis	61.5%	57.1%	73.3%	59.2%	0.578

Table A 8: Business Plan dimensions taught: differences in means by nationality

% respondent that asserts the dimension was taught	All	Non-Portuguese	Portuguese	Kruskal Wallis test (p-value)
Company and Product/Service Description	91.0%	81.8%	92.5%	0.252
Strategic Analysis	88.5%	81.8%	89.6%	0.460
Industry and Market Context – External Analysis	71.8%	54.5%	74.6%	0.173
Marketing and Sales Plan	91.0%	81.8%	92.5%	0.252
Team – Personnel and Management	57.7%	45.5%	59.7%	0.378
Financial Analysis	85.9%	81.8%	86.6%	0.677
Risk Analysis	61.5%	63.6%	61.2%	0.878

Table A 9: Business Plan dimensions taught: differences in means by years of professional experience

% respondent that asserts the dimension was taught	All	0-3 years	4-9 years	10 or more years	Kruskal Wallis test (p-value)
Company and Product/Service Description	92.0%	96.0%	88.5%	91.7%	0.614
Strategic Analysis	89.3%	92.0%	92.3%	83.3%	0.518
Industry and Market Context – External Analysis	73.3%	68.0%	73.1%	79.2%	0.680
Marketing and Sales Plan	90.7%	96.0%	92.3%	83.3%	0.299
Team – Personnel and Management	58.7%	60.0%	53.8%	62.5%	0.816
Financial Analysis	86.7%	96.0%	80.8%	83.3%	0.239
Risk Analysis	62.7%	68.0%	57.7%	62.5%	0.751

Are the business plan's dimensions useful?

Notes:

In all tables *** (**)[*] means statistically significant at 1%(5%)[10%]

The values in the tables correspond to the percentage of respondents who perceive the selected items as useful or very useful (8 and more in a scale of 10)

Table A 10: Business Plan dimensions perceived usefulness: differences in means by enrolment status

	All	Interruped attendance_ Lapsed	Attending MIETE	Concuded MIETE	Kruskal Wallis test (p-value)
Company and Product/Service Description	42.3%	42.9%	40.0%	42.9%	0.980
Strategic Analysis	37.2%	35.7%	40.0%	36.7%	0.967
Industry and Market Context – External Analysis	25.6%	21.4%	6.7%	32.7%	0.124
Marketing and Sales Plan	39.7%	42.9%	33.3%	40.8%	0.847
Team – Personnel and Management	21.8%	28.6%	26.7%	18.4%	0.634
Financial Analysis	30.8%	42.9%	33.3%	26.5%	0.496
Risk Analysis	23.1%	42.9%	20.0%	18.4%	0.155

Table A 11: Business Plan dimensions perceived usefulness: differences in means by nationality

	All	Other	Portuguese	Kruskal Wallis test (p-value)
Company and Product/Service Description	42.3%	27.3%	44.8%	0.279
Strategic Analysis	37.2%	27.3%	38.8%	0.466
Industry and Market Context – External Analysis	25.6%	27.3%	25.4%	0.894
Marketing and Sales Plan	39.7%	27.3%	41.8%	0.365
Team – Personnel and Management	21.8%	18.2%	22.4%	0.756
Financial Analysis	30.8%	36.4%	29.9%	0.666
Risk Analysis	23.1%	36.4%	20.9%	0.262

Table A 12: Business Plan dimensions perceived usefulness: differences in means by academic background

	All	Business	Engineering	Others	Kruskal Wallis test (p-value)
Company and Product/Service Description	42.7%	35.0%	47.4%	41.2%	0.661
Strategic Analysis	38.7%	35.0%	39.5%	41.2%	0.920
Industry and Market Context – External Analysis	26.7%	30.0%	26.3%	23.5%	0.905
Marketing and Sales Plan	40.0%	30.0%	39.5%	52.9%	0.368
Team – Personnel and Management	22.7%	35.0%	21.1%	11.8%	0.234
Financial Analysis	30.7%	25.0%	34.2%	29.4%	0.766
Risk Analysis	24.0%	25.0%	23.7%	23.5%	0.993

Table A 13: Business Plan dimensions perceived usefulness: differences in means by professional experience

	All	0-3 years	4-9 years	10 or more years	Kruskal Wallis test (p-value)
Company and Product/Service Description	42.7%	44.0%	50.0%	33.3%	0.490
Strategic Analysis	38.7%	36.0%	53.8%	25.0%	0.109
Industry and Market Context – External Analysis	26.7%	20.0%	30.8%	29.2%	0.651
Marketing and Sales Plan	40.0%	48.0%	46.2%	25.0%	0.194
Team – Personnel and Management	22.7%	20.0%	23.1%	25.0%	0.916
Financial Analysis	30.7%	32.0%	26.9%	33.3%	0.874
Risk Analysis	24.0%	32.0%	19.2%	20.8%	0.518

Table A 14: Perception of usefulness of Business Plan Tools: correlations between variables

The perceived usefulness of Business Plan TOOLS		Value Proposition Usefulness	Created companies after MIETE (dummy)	Logaritm of Years of Professional Experience	Academic Background: Engineering	MIETE Edition: Before 2008	Interrupted MIETE (Dummy)	Concluded MIETE (dummy)	Logaritm of Years of Age	Nationality (dummy)
Value Proposition _ Usefulness	Pearson Correlation	1	-.032	-.017	.030	.283*	-.114	.036	.086	-.085
	Sig. (2 ends)		.800	.891	.809	.021	.361	.773	.491	.500
Created companies after MIETE (dummy)	Pearson Correlation		1	.025	.032	.031	.197	-.093	.095	.043
	Sig. (2 ends)			.841	.800	.802	.112	.457	.448	.732
Logaritm of Years of Professional Experience	Pearson Correlation			1	.003	.043	.139	-.103	**.760****	.239
	Sig. (2 ends)				.978	.732	.265	.411	**.000**	.053
Academic Background: Engineering	Pearson Correlation				1	.283*	.038	-.036	.165	.085
	Sig. (2 ends)					.021	.761	.773	.187	.500
MIETE Edition: Before 2008	Pearson Correlation					1	-.102	-.307*	.482**	.239
	Sig. (2 ends)						.413	.012	.000	.053
Interrupted MIETE (Dummy)	Pearson Correlation						1	-.269*	.101	-.003
	Sig. (2 ends)							.029	.421	.980
Concluded MIETE (dummy)	Pearson Correlation							1	-.342**	-.174
	Sig. (2 ends)								.005	.162
Logaritm of Years of Age	Pearson Correlation								1	.332**
	Sig. (2 extremidades)									.007
Nationality (dummy)	Pearson Correlation									1
	Sig. (2 ends)									

*. The correlation is significant to level 0,05 (2 ends); **. The correlation is significant to level 0,01(2 ends).

Table A 15: Perceived usefulness of Business Plan dimensions: Correlations among variables

		Usefulness of Company and Product/ service description	Created companies after MIETE	Ln of Years of experience	Business Academic Background	Engineering Academic Background	Edition of MIETE_ before 2008	Edition of MIETE between 2008 and 2012	Interrupted attendance of MIETE	Concluded MIETE	Ln of age (in years)	Nationality (dummy)
Usefulness of Company and Product/service description	Pearson Correlation	1	.275*	-.060	-.093	.096	.179	-.050	-.039	-.027	.090	.129
	Sig. (2-tailed)		.017	.610	.425	.411	.124	.667	.740	.818	.442	.270
Created companies after MIETE	Pearson Correlation		1	-.055	-.026	.048	-.005	.046	.214	-.057	.013	-.039
	Sig. (2-tailed)			.639	.826	.682	.964	.696	.065	.626	.912	.741
Ln of Years of experience	Pearson Correlation			1	.014	-.016	.062	-.033	.102	-.125	**.778****	.287*
	Sig. (2-tailed)				.903	.889	.597	.776	.386	.286	**.000**	.012
Business Academic Bakground	Pearson Correlation				1	**-.611****	-.074	.040	-.037	-.075	.002	-.006
	Sig. (2-tailed)					**.000**	.528	.731	.752	.520	.985	.961
Egineering Academic Background	Pearson Correlation					1	.207	-.093	.029	-.040	.138	.043
	Sig. (2-tailed)						.075	.429	.804	.733	.236	.713
Edition of MIETE_ before 2008	Pearson Correlation						1	**-.545****	-.105	-.291*	.462**	.241*
	Sig. (2-tailed)							**.000**	.371	.011	.000	.037
Edition of MIETE between 2008 and 2012	Pearson Correlation							1	.137	-.267*	-.116	.086
	Sig. (2-tailed)								.243	.020	.320	.465
Interrupted attendance of MIETE	Pearson Correlation								1	-.229*	.070	-.009
	Sig. (2-tailed)									.048	.554	.937
Concluded MIETE (dummy)	Pearson Correlation									1	-.350**	-.170
	Sig. (2-tailed)										.002	.146
Ln of age (in years)	Pearson Correlation										1	.372**
	Sig. (2-tailed)											.001
Nationality (dummy)	Pearson Correlation											1
	Sig. (2-tailed)											

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).